GENERAL BOARD OF HEALTH.

REPORT

ON

QUARANTINE.

Presented to both Houses of Parliament by Command of Her Majesty.

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REPORT ON QUARANTINE.

May it please your Majesty,

We, the General Board of Health, having, in the exercise of the powers confided to us for the prevention of the spread of epidemic, endemic, and contagious diseases, had our attention called to the subject of Quarantine, having consulted the most extensive experience and observation thereon, and being impressed with the conviction that the preservation of the Public Health requires the substitution of preventive measures, founded on principles fundamentally different from those of quarantine, deem it our duty to present the result of our inquiry into this system, which we now do in this our Report, as follows:—

The first exercise of our duties in watching the re-approach of Asiatic cholera to our shores was almost exclusively occupied by inquiries into the state of the shipping at foreign ports where the disease prevailed, and at British ports where the disease had broken out in vessels arriving from infected countries. We were immediately called upon to devise measures for the prevention or alleviation of cases of cholera and other epidemic diseases on shipboard, which we found occurred more frequently than we were prepared to expect in the open sea. Our attention was at the same time attracted to the subject of quarantine by the circumstance that several vessels arriving from ports in the Baltic with cholera on board were by Order in Council placed in quarantine; and during the progress of this disease much evidence being presented to us of the injurious effects, in individual instances, that appeared to result from the manner in which Quarantine Regulations were enforced in English ports, we deemed it to be our duty to make a representation to the Privy Council on this subject, in a communication bearing date November 9, 1848. (Appendix 1., p. 131.)

We were again required to reconsider the subject in replying to questions addressed to us, on the 24th of November, 1848, by Lord Palmerston.

Subsequently we received additional information as to the general condition of the ships of the mercantile marine, which still further satisfied us of the necessity of seeking the accomplishment of the object of quarantine by different means than those which this system sanctions and adopts.

The object of quarantine is to prevent the introduction of epidemic diseases from one country into another, and its regulations are based on the assumption of the contagiousness of the diseases with which it deals; it being supposed that such diseases are propagated by contact, direct or indirect, of the unaffected with the affected. In accordance with this view the preventive means adopted by quarantine consist of the isolation of the sick or suspected, with whom it interdicts all communication, whether by person or by articles deemed capable of transmitting contagion.

When quarantine was first established, the spread of epidemic diseases exclusively or chiefly by contagion was a doctrine universally received; but during the last century a change has gradually taken place in professional opinion in almost every country in Europe, particularly in France, Russia, and Austria, as well as in America, with respect at least to several of these diseases, chiefly by medical officers, who, having had the charge of the health of fleets and armies in different quarters of the globe, have been under the necessity of studying the circumstances connected with the outbreak and spread of formidable epidemics; and also by those who, having had the care of hospitals and dispensaries in large cities, have been obliged to visit the localities and abodes of the poorer classes, where these diseases are always the most prevalent.

Concurrently with the change that has taken place in the opinion of medical men having this extensive and special experience, the result of various inquiries by Parliamentary Committees, and of resolutions passed by the House of Commons in successive Sessions, particularly during the last twenty-five years, has been a cautious but gradual relaxation of the stringency of quarantine regulations, an abandonment of them altogether in relation to some diseases to which they were once strictly applied, and a growing doubt whether they really accomplish their object with regard to any diseases whatever.

Epidemic diseases were formerly universally considered to be essentially different in their nature, each being thought to depend on its own specific contagion; and the correctness of this view seemed to be confirmed by the great apparent difference between typhus, scarlatina, influenza, plague, yellow fever, and cholera; but whether each of these diseases depends on a peculiar and specific cause, or whether they all derive their origin from one common agent, essentially the same in nature, but modified by peculiarities of climate and other circumstances, and which under varying conditions gives rise to various forms or types of disease, each having definite characters and running a particular course,—whichever of these views be adopted, it is agreed by the most eminent investigators that there is a general resemblance between these various forms of disease, and that they have the following characters in common:—They are all fevers; they are all dependent on certain atmospheric conditions; they all obey similar laws of diffusion; they all infest the same sort of localities; they all attack chiefly the same classes, and, for the most part, persons of the like ages; and their intensity is increased or diminished by the same sanitary and social conditions.

The consideration of these common properties of pestilence, under whatever form or name it may occur, has led to the general conclusion that the true safeguards against pestilential diseases are not quarantine regulations, but sanitary measures—that is to say, measures which tend to prevent or remove certain conditions, without which pestilential diseases appear to be incapable of existing.

The whole machinery of quarantine is based on the assumption that by an absolute interdiction of communication with the sick, either by the person or by infected articles, it can prevent the introduction of epidemic disease into an unaffected community.

But this assumption overlooks the essential condition on which epidemic disease depends, namely,—the presence of an epidemic atmosphere, without which it is now generally admitted that no contagion, whether imported or native, can cause a disease to spread epidemically. Allowing, therefore, to contagion all the influence which any one supposes it to possess, and to quarantine all the control over it which it claims, there remains the condition, the primary and essential condition, which confessedly it cannot reach, namely, the epidemic atmosphere.

The experience of the present epidemic season affords evidence that the influence of an epidemic atmosphere may exist over thousands of square miles, and yet affect only particular localities. The cases of cholera which have occurred in numerous and widely distant parts of England and Scotland mark the presence of the epidemic influence; yet over this extended area cholera has fixed itself and prevailed as an epidemic only in very few places. Why has it localized itself in these particular places? Probably because it has there found conditions of a specific kind, either local or personal, or both. It follows that our true course is to make diligent search for all localizing circumstances, and to remove them, so as to render the locality untenantable for the epidemic. But quarantine makes no such search, and leaves all localizing conditions untouched and unthought of.

Hence the signal failure of quarantine as a means of prevention, with reference at least to the most prevalent epidemics, in all the nations of Europe in which it has been tried in modern times; and hence the result just adverted to, namely, the general relaxation, and in some instances the total abandonment, of the system of quarantine, with reference to several diseases against which it was formerly rigidly enforced, and the growing distrust in the supposition that measures of this kind really afford protection against the introduction of any epidemic disease into any country.

Attention has recently been attracted to certain natural phenomena which appear to be more or less intimately connected with the first manifestation of an epidemic atmosphere in a country, among the most remarkable of which are those disturbances in the physical condition of the atmosphere which have been observed from ancient times to precede and accompany all great epidemics, and which have been witnessed generally on the occurrence of such epidemics in the present day.

The influenza, for example, which was formerly believed to be a disease of a highly contagious nature, became epidemic in London in the week ending November 27, 1847. This outbreak was preceded and accompanied by extraordinary risings and fallings of the barometer, by violent storms of wind and rain, by great and sudden alterations of temperature, and by such a disengagement of moisture in the shape of fog as to make it dark at mid-day. "No electricity," says the Registrar-General, "stirred in the air during that week; all was still, as if Nature held her breath at the sight of the destroyer come forth to sacrifice her children."

Whatever may be the true connexion between these phenomena and the efficient cause of influenza, it is clear that quarantine could have exerted no more influence in preventing the introduction of this disease into the metropolis during that week, than it could in controlling the wind which in a single night strikes the vegetation of a country with blight.

Similar phenomena have been observed to attend the outbreak of cholera. On the great outbreak at St. Petersburg, for example, namely, about the first week in June, 1848, "a remarkable change," says Dr. Adair Crawford, "took place in the weather. There were almost constant high winds, shifting frequently and suddenly round to every point of the compass, and often accompanied with torrents of rain and sometimes thunder. This disturbed state of the atmosphere was indicated by sudden fallings and risings of the barometer, sometimes to the extent of between 1 and 2 inches. The changes of temperature were equally frequent and rapid, the heat being for several days together very great, as high as from 84° to 90° of Fahrenheit, and the air extremely sultry and oppressive, with a damp relaxing south wind; and then suddenly, on a change of wind, and sometimes on the occurrence of a thunderstorm, this oppressive heat would be succeeded by great cold, the thermometer falling as much as 50° in a few hours, so that it was several times in June nearly as low as the freezing point.

"Another peculiarity in the condition of the air was the disturbed state of its electricity. This was clearly demonstrated by the fact that the electric machines could not be charged, and, to a great extent, lost their power, as generally happens whenever the atmosphere is damp and unsettled. The same remark was made respecting the strength of several large magnets.

"The peculiarities in the condition of the atmosphere just described have been observed by several ancient writers, and especially by the celebrated Dr. Sydenham, to precede and accompany usually all great epidemics. It has also been supposed that these peculiarities are connected with epidemics as their exciting causes, though the precise manner in which they act has hitherto remained unknown."

However they may act, quarantine can exercise no more influence over them than over the temperature and electricity of the atmosphere, or the direction and force of the wind.

Similar observations have been made respecting the influence of the state of the weather on the prevalence and mortality of plague. "During the plague season," says Dr. Laidlaw, "the atmosphere is constantly charged with moisture; so much so that the difference between the dry and the wet bulb of the thermometer is not more than two or three degrees, the average throughout the year in Egypt being about eight or ten degrees. I do not know that this applies to Cairo, my observation being made at Alexandria, but I suppose the evaporation is greater at Cairo. The effects of these atmospheric phenomena are so well known to the natives in Egypt that they express their hopes or their fears according to indications presented to them by the state of the weather. When there is a N.W. breeze with a dry atmosphere they say, 'If it please God their friends will recover;' but on the contrary, if the wind is S.E., or *khampsein*, as it is called, it is considered as markedly fatal."

Medical officers having the charge of large districts have made similar observations with reference to the common epidemics of our own country. They know from experience that in certain states of the weather there will be an outbreak of zymotic disease of some sort in the ill-conditioned districts under their care; it may be typhus, it may be scarlatina, or it may be small-pox or measles; and they can predict that in the localities in which such diseases are already prevailing, the severity of the cases will have increased. "Under certain atmospheric conditions," says Mr. Wagstaff, police and parochial surgeon of Lambeth, "when I arose in the morning and found the atmosphere warm and moist, I could always foretel that there would be an increase of malarian disease of some sort in these places, and that they would be more intense in degree; so that in this state of the atmosphere I always knew I should have more to do in these low, close, undrained, and crowded places."

The medical officers of fever hospitals have observed a similar increase in the severity of the symptoms of fever under the like atmospheric conditions.

The periodical return of epidemic diseases appears to afford further corroboration of the connexion between this class of diseases and particular atmospheric conditions. The periods when fever prevails in an extraordinary and excessive degree in the metropolis appear to recur after certain intervals with more or less regularity. Such periods, with reference to plague, are stated to return about every ten years; and it seems to be ascertained that when they do recur they are limited strictly to a particular season of the year: that is, they never commence until November nor continue after June. Something of the same kind of periodicity has been observed with reference to the excessive outbreaks of fever in Ireland. In a report on the causes of death in Ireland, appended to the census of 1841, Mr. Wilde states that when the Irish records of this class of affections are accurately examined, it is found that, notwithstanding all that has been written and asserted upon the influence of want and distress in the production and spread of fever, fever has raged nearly decennially for the last 150 years. "I do not mean to say," he observes, "that it has become epidemic or fatal exactly upon the tenth year; but from the eighth to the twelfth, with an interval of from six to eight years; thus it appeared in 1808, 1718-21, 1728-31, 1740-43, 1763-64, 1771-73, and 1817-21. In the year 1832-33 cholera took its place; but in 1837 it again appeared; and the year 1842 has been marked by a most fatal epizootic. Why these lapses of twenty years, or whether our records are deficient for these periods, cannot now be determined; this periodic invasion is nevertheless curious though unaccountable. "The wind bloweth where it listeth, and thou hearest the sound thereof, but canst not tell whence it cometh or whither it goeth."

We cannot tell, because meteorological science, as connected with the propagation and spread of disease, is as yet in its infancy. We have, indeed, some knowledge of the influence of two of the more obvious conditions, namely, those of heat and moisture; but of the action of the subtler agents, such as electricity and magnetism, the present state of science affords us little information. Still there are unequivocal indications that there is a relation between the conditions of the atmosphere and the outbreak and progress of epidemic disease, though we are as yet ignorant of the nature of that relation; but whatever it may be, we may be quite sure that it is beyond the influence of any such agency as that of quarantine.

The extent of the range of great epidemics equally shows that they are beyond the control of quarantine. Influenza and cholera, which often follow each other, and which observe similar laws of diffusion, traverse the globe in zones, generally, if not always, from east to west.

On viewing the evidence of the vast extent of this range, the questions which must present themselves are—Can a quarantine vessel placed at the entrance of one or two seaport towns—can a line of soldiers, guarding a few miles of the frontier of an individual country—stay the progress of morbific agents which thus pursue their irresistible course over the greater part of the habitable globe?

The steadiness with which great epidemics pursue their course proves that they are governed by laws over which quarantine can exercise no control. In tracing the rise and progress of cholera in British America during the years 1832 and 1834, Colonel Tulloch observes that nothing is more remarkable than the post-like regularity with which on both occasions it advanced in the same course, attacking the same places on nearly the same corresponding days. "Take, for instance," he says, "its progress along the line of the St. Lawrence and the lakes :—

	Date of Appearance of the Disease.	
	1832	1834
Quebec	8th June	7th July
Three Rivers between Montreal and Quebec . . .	Escaped	9th ,,
Montreal, 180 miles above Quebec	10th June	11th ,,
Kingston, 190 miles beyond Montreal	16th ,,	26th ,,
Toronto, 184 miles beyond Kingston	28th ,,	30th ,,
Fort George, 40 miles from Toronto	14th July	13th August
Detroit and Amertsberg, at the extremity of Lake Erie	6th ,,	End of August

"Here, with the single exception of Fort George, at which it appeared a few days later in 1832 than might have been expected from its geographical position, this singular disease may be said to have travelled with post-like regularity.

"Along the banks of the Ottawa it pursued the same steady course, as well as up the Richelieu and along the Lake Champlain, through the United States to New York."

The rapidity of the course of great epidemics further shows how vain the attempt must be to stop their progress by such machinery as that of quarantine. When influenza broke out in London in 1847, it spread on the same day over every part of the metropolis. "It met you everywhere," says the Registrar-General; "nearly the whole population were affected more or less, and without taking slight instances not less than 500,000 persons in 2,100,000 suffered in London from the epidemic." When it broke out in Edinburgh it spread with the same rapidity over every part of that city. In like manner, when cholera broke out in Cairo in 1831, it spread, within the space of five days, over the whole of Lower Egypt, infecting at the same time all the towns and villages of the Delta. In 1832 it leaped at one bound from London to Paris, and out of the forty-eight quarters of that city it spread in five days over thirty-five. What conceivable influence, we may ask, can quarantine or sanitary cordons exert in checking the progress of diseases possessed of such powers of diffusion?

But there is another consideration which alone appears sufficient to show that no reasonable confidence can be placed in quarantine as a means of protection against the introduction of pestilential diseases. Epidemics are in general really present in a country and disorder the health of the people, before they are manifested in their peculiar and recognized forms. The significant signs by which their presence is declared are commonly called premonitory symptoms. These premonitory symptoms are more than warnings: they are indications of the actual presence of the disease; evidences that it has already commenced its work.

It has been long observed that great epidemics are usually preceded by circumstances evidentiary of a change of condition in the health of the people, which is commonly regarded as constituting a predisposition or susceptibility to their influence some time before they make their decided and general attack. Thus it was observed by Sydenham, who has left a record of the epidemics that prevailed in London in the middle of the 17th century, for a successive period of sixteen years, including the time immediately before and after the Great Plague, that a remarkable change took place in the character of fevers and other diseases, approximating the general type of disease in several striking features to the distinguishing characteristics of the pestilence at hand, some months before that dreadful malady assumed its distinct and proper shape, which it did at last quite suddenly.

A similar observation was made and recorded by Dr. Southwood Smith with reference to the type of fever in London, six months before the visitation of cholera in 1832. During the six months immediately preceding the first appearance of cholera in this country, the character of fever in London so entirely changed, that typhus, which for a long series of years had been essentially an inflammatory disease, became a disease of debility, so closely resembling cholera, that the fever into which cholera patients commonly fell could not be distinguished from the primary fever found in the wards of the fever hospital when cholera was at its height, which had appeared there for the first time six months previously, but which has never disappeared since.

Before the erection of quarantine as a barrier therefore the disease is already in the country busily in action, vitiating the blood of the most susceptible of the population, and preparing the way for its general outbreak.

We have had much evidence presented to us with reference to Asiatic cholera that the violent and fatal symptoms, instead of being the commencement of the disease, are generally the terminations of precedent constitutional changes, the first of which are denoted in the form of premonitory symptoms.

But the influence of great epidemics is not limited to human beings; it extends to all classes of domestic animals, and there is reason to believe even to plants, thus apparently affecting the health of both kingdoms of organized and living beings. It is stated in the report of the Sanitary Commissioners that contemporaneously with the change noted in the character of fever in the London Fever Hospital, an analogous change had been observed by the professors of veterinary medicine and surgery in the diseases of dogs, horses, sheep, and cattle; namely, a change from an inflammatory type to one of debility, and that this had been observed to be particularly the case with regard to all the diseases properly considered epidemic to which these animals are subject. This change, it is stated, was so complete, that it had been found absolutely necessary to alter the entire system of remedial treatment with reference to the diseases of these classes of animals, and instead of using bleedings and other means of depletion suited to diseases of an inflammatory type, to employ remedies of a sustaining and stimulant character, suited to diseases in which the powers of life are depressed and feeble—precisely the change that had taken place in the wards of the London Fever Hospital.

It is stated by Dr. Thomas Lesslie Gregson, who was at Alexandria during the prevalence of the great plague of 1836, on duty there as surgeon in chief to the Naval, Military, and Civil Hospital, that cattle were attacked with decided symptoms of plague some time before the disease broke out among the human species. "Before the disease broke out," he says, "a number of the Pacha's oxen were seized with a malady, of which above one hundred died in a few days. I was sent to investigate and report on this epidemic. On examination I found gastro-enterite in the most intense degree; so much so, that I have found extensive gangrene in oxen that have only been observed ill twelve hours. They had also large buboes. This I reported plague, and caused them to be interred deeply."

The coincidence of blight with pestilence has been recorded from ancient times, and the wide-spread potato-disease, which has now extended to almost every region of the globe, concurrently with the presence of the influenza and cholera poisons in the atmosphere, may possibly be a modern instance of it. At all events, it is certain that seasons which are unusually sickly to large classes of human beings, are often alike unfavourable to the health and fruitfulness of many classes of plants.

But it has been stated that however wide the range over which the influence of any epidemic may extend, it cannot localise itself in any particular spot unless it find there fitting conditions; and that by attending to localizing conditions and removing them, we can avert its attack or arrest its progress when it does break out. This most gratifying and encouraging result has been obtained on a large scale in numerous places with reference to influenza, typhus, and cholera; and the whole tenor of recent experience leads to the conclusion that, in proportion to the intelligence and energy exerted for the removal and prevention of the localizing conditions on which the presence of epidemic disease is now known to depend, we can secure immunity from it.

Thus influenza in 1847 was found to be four times more prevalent in some parts of London than in others; and in the country, while in some districts almost the entire population were affected, in others not a single individual suffered. The local conditions on which this extraordinary susceptibility to the disease or comparative immunity from it depended are in a great measure known, and are found to be within our control.

In like manner after a careful examination of the experience of Hamburg with reference to the visitation of cholera in 1832, the general result, resting on accurate statistics, is that with regard to the same class of the population there were among those residing in the dirty and close parts of the town five times as many attacks of cholera, and nearly four times as many deaths, as among those residing in the clean and airy part of it; that is, irrespective of the condition of poverty, the difference in the sanitary condition of those two parts of the town rendered the same class of inhabitants in the one district five times more susceptible to the disease than those residing in the other, and increased the actual mortality of the most susceptible fourfold.

But Hamburg accidentally affords a means of illustrating the power of improved local condition to secure exemption from the presence of epidemic disease during the general prevalence of an epidemic influence in its highest intensity, by an observation so exact and on so large a scale as to deserve particular reference to it.

Since the epidemic of 1832, a large proportion of Hamburg has been reduced to ashes by the great fire of 1842, nearly one-third of the central part of the town having been destroyed. This part of the city has been reconstructed on a plan avowedly in conformity with the principles of improvement developed in the Sanitary Report; and though these principles have not been fully carried out, yet the result of an improved sanitary condition as far as it has been realised is thus stated by Mr. Grainger:—

" No statistical Report of the epidemic of the present year similar to that of Dr. Rothenburg has yet been published;* but after extensive inquiries among several physicians, I am fully justified in stating that the rebuilt part of Hamburg has experienced an exemption from cholera which is as remarkable as it is important. All the medical men with whom I conversed upon the subject expressed themselves unequivocally to this effect; and, indeed, the thing is so notorious, as to be well known to the inhabitants generally. Dr. Rothenburg stated to me in evidence, that although there had not been time to classify the cases, it was clear that the epidemic had not advanced so far towards the Alster, or new part of the town, as in 1832. Other physicians state that it has been particularly confined to persons living near the Elbe. Mr. Völkers, whose office enabled him to form a more accurate judgment than other individuals, since it was his duty to take the addresses of all the applicants who came to the central bureau, in answer to my inquiries, states that from extended observation he had ascertained that, comparing the poor residing in the rebuilt parts of the town with those living in the old portion, not more than one of the former had been attacked with cholera for ten of the latter.

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* Since this was written the official account of the progress of cholera in Hamburg during the last year (1848), drawn up by Dr. Buch,

"As certainly as the per-centage of typhus decreases with improved drainage, paving, and ventilation, so also will epidemic cholera. The proof of this has been afforded on a grand scale at Hamburg. The ravages of the disease have received a marked check in the present outbreak by the substitution of wide, open, and well-drained streets for narrow, filthy, and damp thoroughfares; by the removal of high mounds of earth, blocking up the streets and overshadowing the houses, and by guarding a large evaporating surface of water from contamination."

But quarantine pays no regard to these conditions. Blindly intent on accomplishing an impossible object, it overlooks the circumstances on which the existence and extension of disease really depend; and after the experience of centuries has shown the inutility of the securities it offers, it still proposes to go on reposing implicit confidence in them and in them only.

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has reached England, and this document fully confirms in the main points the previous statements.

Quarantine is based, as has been stated, on the assumption that epidemic diseases depend upon a specific contagion; but the question of contagion has no necessary connection with that of quarantine. The real question is whether quarantine can prevent the extension of epidemic diseases, whatever may be their nature, whether contagious or not. If it can, it is valuable beyond price; if it cannot, it is a barbarous incumbrance, interrupting commerce, obstructing international intercourse, periling life, and wasting, and worse than wasting, large sums of the public money.

But if the power of protecting the country from the introduction and spread of disease, whether contagious or otherwise, claimed by quarantine, be really possessed by it, this must be proved by other considerations than those which establish the contagiousness of disease: it is a mere matter of evidence and experience, and consequently the disputed point of contagion should be placed entirely out of view in this discussion, and the whole question should be argued on the broad ground whether or not quarantine is a public security, or is capable of affording practically any useful result.

There is indeed one point of view in which it may be proper, and even necessary, to consider the question of contagion with relation to that of quarantine. Assuming the existence of contagion, if it can be proved that quarantine, instead of affording any protection against contagion, absolutely fosters it, then the stronger the proof of contagion the more decisive the argument presented by it against quarantine; and it will be shown hereafter that this is the true and the only relation in which contagion stands to this question.

There is no more reason why the controversy on contagion should complicate the question of quarantine than why it should continue to encumber the general subject of the removeable causes of disease, from which efforts have long been made to disentangle it. "It cannot but be regretted," says the Sanitary Report, "that the enlightened force of public opinion should sustain any diminution from an apparent want of unanimity in so important a question as the necessity of removing the causes of disease, whether original or predisposing; that, for example, whilst fleets were ravaged by fever, men of high standing should have occupied the attention of the public with speculations on contagion and infection from the gaols as the original cause, and diverted attention from the means of prevention, cleansing and ventilation, the means by which, as will hereafter be shown, the pestilence was ultimately banished."

"The medical controversy as to the causes of fever," says Dr. Cowan, "as to whether it is caused by filth and vitiated atmosphere, or whether the state of the atmosphere is a predisposing cause to the reception of the fever, or the means of propagating that disease, which has really some other superior, independent, and specific cause, does not appear to be one that for practical purposes need to be considered, except that its effect is prejudicial in diverting attention from the practical means of prevention."

In like manner the discussion whether epidemic diseases arise and spread from contagion or from common or specific poisons generated in the localities in which these pestilences first break out, has nothing whatever to do with quarantine, the sole inquiry with reference to this question being whether, however epidemic diseases arise, quarantine can prevent their introduction into a country or arrest their progress when there.

Still, however, before entering into a special consideration of the subject of quarantine, as the question of contagion is intimately associated in the minds of many persons with that of quarantine both in this and in foreign countries, and as a popular belief in contagion, among other mischievous effects, increases the susceptibility to epidemic disease by the creation of panic, and involves moral and social consequences of great importance, we think it desirable to avail ourselves of this occasion to present a brief view of the general tendency of the opinion of observers with reference to contagion, and to state some facts bearing on this question which have come under our own observation during the present epidemic season. We regard the diffusion of this information as important with reference to other countries as well as our own.

We apprehend few will question our former statement that the progress of the opinion of observers in Europe during the last half-century has been steadily towards a material modification, if not an entire abandonment, of the doctrine of contagion with reference to the majority of epidemic diseases, taking the word contagion in its strict sense, that is, the communicability of disease exclusively by contact: direct, that is, with the body or breath of an infected person; or indirect, with something which an infected person has touched. An eminent medical writer, whose capacity and opportunities enable him to judge correctly of the state of medical science, observes,—

"In the course of inquiry into the causes of fever by various authors during the last fifty years, one thing is clear, that more and more stress is daily laid on terrestro-aërial causes, and less on specific contagion. While some inquirers have denied that plague itself originates from contact or contagion, the greater part of the more close observers have limited very much the range of this dreaded agent, and viewed fevers, as well as many other diseases, as generally of an epidemic nature."—*Medico-Chirurgical Review, January*, 1835. See also Appendix 8, page 160, *et seq.*

The contagious origin and spread of epidemic diseases having long been taught in colleges and schools, almost all medical men begin their professional life with this belief, and it is only those who are endowed with the comparatively rare power of observation that ever abandon that conviction. One example, however, of a candid public acknowledgment of error on the part of a great physician is so remarkable as to deserve commemoration.

Dr. Rush, of Philadelphia, the chief authority of his age with respect to epidemic diseases, after having witnessed the recurrence of yellow fever as an epidemic during four successive seasons, thus retracts the opinion in which he had been educated, and which he himself had once earnestly inculcated:—"In the fourth volume," he says, "the reader will find a retraction of the author's (Dr. Rush's) former opinion of the yellow fever spreading by contagion. He begs forgiveness of the friends of science and humanity, if the publication of that opinion has had any influence in increasing the misery and mortality attendant upon that disease. Indeed, such is the pain he feels in recollecting that he ever entertained or propagated it, that it will long, and perhaps always, deprive him of the pleasure he might otherwise have derived from a review of his attempts to fulfil the public duties of his profession."

It is remarkable that the change of opinion which has taken place on this subject in Great Britain, has advanced with greater decision and rapidity among non-professional persons engaged in commercial and public life than among medical men. It is not a technical question, but one of evidence, on which a person capable of observation is as competent to judge as any physician. Such a person, indeed, may have the advantage of having nothing to unlearn. The Spanish Cortes in 1822, by a considerable majority, in direct opposition to the unanimous opinion of all the physicians who were members of their own body, being nine in number, as well as to the general belief of the physicians of Spain, rejected the project of a code of sanitary laws, founded on contagion, which had been prepared by three successive Committees or Commissions of Public Health. It is also observable that the Committees of the House of Commons in our own country have generally indicated a more advanced state of opinion on this subject than the majority of the physicians whom they have had under examination.

Still, however, the medical authorities of the present day, particularly those who have had the most extensive means of observation, appear to have so far modified the strict doctrine of contagion as to be agreed that a corrupted condition of the atmosphere is an essential pre-requisite to the existence of any epidemic disease; that no imported virus, though it may affect individuals, can without this pre-requisite spread over the population of a healthful place; that diseases which spread by atmospheric influence may and commonly do originate in the countries or places they attack; and that even when they are produced in other countries, they are transmitted not by infected persons, but by an infected atmosphere. Thus Dr. Ranken, the author of the report on the Pali Plague, a malignant fever which in 1836 broke out in India and ravaged certain parts of Ragpootana, in the following passage expresses the general opinion of physicians of the present day in all European nations who have been actively employed in the observation and treatment of epidemic diseases:—

"Sydenham, who practised while the plague ravaged England; Mead, who studied it profoundly; and Russell of Aleppo, who lived where it raged for three years, have all taught us that without the essential preliminary of an 'epidemic atmosphere' on the spot, foreign contagion is inert, and that unless both concur no pestilence ensues. Hence the latter states that the city of Aleppo, though in unrestricted and constant communication with Egypt and other parts of the Turkish empire, where the plague appears annually, used to be affected on an average only once in eighteen years. The unknown influence which they called an epidemic atmosphere was also reckoned by the ancients to be the invariable forerunner or concomitant of spreading sickness. In their judgment half the cause at least, one blade of the destroying shears, is forged at home, and without it the other cannot do the work of fate."

The preponderant evidence derived from the most recent observation and experience in this and other countries, appears to lead to the same conclusion. We may observe, however, that the evidence here referred to has no reference to mere medical opinion, but is founded on undoubted facts recorded as the results of the experience of competent observers. Medical opinions vary, and on some important points of science clash; but in the whole of this Report we have, as far as was practicable, cited and been guided by the results of the experience of observers who have been either eye-witnesses of the facts they record, or who have received the information they communicate from authentic sources.

Cholera may be taken as an example of the diseases of the epidemic class. When cholera first invaded Europe in 1831, the belief in its contagious nature was almost universal, and in this country in particular there was scarcely a medical man who did not entertain this conviction; but as in India, where this disease is known, the belief in its contagious nature is universally abandoned, so in Europe it gradually diminished in proportion as opportunities of observing the disease increased; and now in Russia, Poland, Prussia, France, Belgium, and England, the contrary view, with few exceptions, is maintained.

Hamburg, which, as has been seen, has set the example of sanitary improvement to the nations of Europe, has also been the first among European cities to act decidedly on the principle of the non-contagious nature of cholera. "The city of Hamburg," says Mr. Grainger, "having often suffered severely from cholera, and in former epidemics expended large sums in the vain endeavour to limit the ravages of the disease when it had once entered the town, by the erection of special cholera hospitals, and by urging the sick to leave their houses, so that they might be isolated from the healthy in these establishments, has been the first to set a more enlightened example to Europe. Having found by costly experience, and after the infliction of much unnecessary suffering, that measures based upon the assumption of the contagiousness of cholera were worse than futile, the Senate of Hamburg, when the last epidemic, that of 1848, approached the city, and after having received the sanction of the medical authorities, decided that the arrangements for the management of the sick should rest on the conclusion that cholera was not contagious; and accordingly the people were encouraged, if attacked, to remain in their own houses, surrounded and attended by their own families; no limit was placed upon intercommunication between the sick and the healthy; and, for the first time in Europe, instead of providing special hospitals for the reception of the limited number of persons who from various circumstances could not be attended to at home, the authorities unhesitatingly decided upon appropriating certain wards of the General Hospital to that purpose.

"In order fully to estimate this important experiment so confidently tried at Hamburg, and tried with perfect success, it is necessary to explain that the General Hospital is one of the largest on the Continent, containing in all, with patients and attendants, no less than 1600 persons. Into this establishment upwards of 300 cholera patients were admitted, who were attended by a large staff of medical men and by relays of nurses furnished by the hospital.

"Having repeatedly visited these cholera wards and scrutinized the arrangements, and having since my return to England had several opportunities both in this country and in Scotland of inspecting the temporary hospitals provided for cholera patients, I am bound to state the great superiority of the former in all that concerns efficiency over the latter.

"It might have been expected that the introduction of cholera patients into the General Hospital would have alarmed the ordinary inmates, but such was not the fact. After express inquiries made to determine the point, it was ascertained that not one patient quitted the institution; not a single nurse asked to be excused from attending on those suffering from the epidemic; on the contrary, they sought to officiate in these wards for the sake of some trifling perquisite.

"The official report of the epidemic of 1849, drawn up by Dr. Buch, and which has been forwarded to the General Board of Health by Dr. Gossler, chief of the police and a member of the Senate, gives the full results of this interesting experiment. From this document it appears that the large number of 363 cholera patients were admitted into the General Hospital, and as soon as the survivors became convalescent they were immediately dispersed indiscriminately among the other patients; that from the 7th to the 22nd of September, during which time 117 cholera cases were admitted, not a single attack occurred among the 1600 inmates; that when the epidemic extended from the south to the north part of the town, and especially after it had become widely spread in the suburb of St. George, in which the large hospital is situated, individual inmates of this establishment were for the first time attacked; and that ultimately and by degrees twenty-two persons were attacked; thus showing, as the author of the report observes, that 'the attacks in the hospital resulted from the influence of the epidemic, not in consequence of contagion.'

"These are, however, precisely the kind of attacks which are from time to time adduced, like the occasional attacks of typhus springing up in the wards of hospitals in this country which receive fever cases, as proofs of contagion: it is said cholera cases have been admitted into a hospital; certain of the nurses and patients have been attacked; therefore they must have caught the disease from those brought in. To such hasty and mere *primâ facie* conclusions the statistics of Hamburg furnish a positive negative; for whilst it is shown by Dr. Buch's report that, at the termination of the epidemic, there had been 3687 attacks in a population of 182,435, giving a proportion of 1 to 49, the attacks in the General Hospital amounted as stated to 22, or 1 in 73, being about one-third less than in the city generally.

"It is also most remarkable that both in Hamburg and Berlin, the nurses and the medical attendants, the precise classes brought into most intimate contact with the sick, experienced so extraordinary an exemption as to attract general attention; thus in Hamburg, in the General Hospital, only three nurses were attacked during the prevalence of the epidemic, and in the whole of the city only one physician was attacked, and I understand that even he had not attended a single case of cholera."

This is in perfect accordance with the experience of the British army, in which it is observed that the orderlies, or the soldiers who are employed as hospital nurses, are not more subject to the disease than others not so employed. "The medical officers," says Colonel Tulloch, "seem to have been almost unanimous in their opinion that the disease was not contagious. In the same ward with the cholera patients in the civil hospital were several persons labouring under other diseases, who, although in constant communication with, and frequently in attendance on, those suffering under the epidemic, were in no instance affected by it. In the military hospital, too, it was observed that the orderlies employed in attendance on the sick were not attacked in a greater proportion than others who were not so employed. A medical officer of one of the corps furnishes the following specific information on this head:—

	Orderlies employed.	Attacked with Cholera.	REMARKS.
30th June to 7th July	30	12	Of these, 12 were attacked within three days after being so employed, 11 within four days, and the rest at various periods, some exceeding four weeks.
8th July „ 12th „	35	13	
12th „ „ 18th „	48	11	
18th „ „ 24th „	48	8	
24th „ „ 29th „	44	3	
30th „ „ 3rd August	14	..	
	219	47	

During the same period the aggregate strength of the corps amounted to	502,	attacked	104
Deduct employed as orderlies	219	,,	47
Remain .	283		57

"Consequently the proportion of attacks among those employed as orderlies was 1 in $4\frac{7}{10}$, and of those not so employed 1 in 5 nearly.

"It may also be stated, as another evidence on this subject, that of 30 medical officers in constant attendance on the sick during the prevalence of the epidemic, all of whom, from the nature of their duties, were subject to great fatigue and anxiety, only one or two exhibited any symptoms of the disease, and their cases were comparatively slight."

One of the ordinary features of this Epidemic is, that the proportion of deaths to recoveries has been very nearly alike in all the Military Commands of which the Medical Records have been investigated; for instance:—

	Attacks.	Deaths.	Proportion of Deaths to Attacks.
Among Cavalry in the United Kingdom, 1832, 1833, and 1834	171	54	10 in 32
,, ,, Troops in Gibraltar, 1834. .	459	131	10 ,, 35
,, ,, ,, Nova Scotia, &c. 1834	210	59	10 ,, 35
,, ,, ,, Canada, 1832 . .	259	94	10 ,, 28
,, ,, ,, Canada, 1834 . .	97	33	10 ,, 29
,, Black Troops at Honduras, 1836 . .	62	20	10 ,, 31

Thus, under all the modes of treatment which may have been adopted on these different occasions, the proportion of deaths to recoveries has not varied above one-fourth; showing that the remedial measures hitherto employed can have had little, if any, effect in counteracting the fatal character of the disease.

Regarding it as our duty not only to make the best provision in our power against the extension of the epidemic on its recent outbreak in this metropolis, but also to observe its progress with attention, and being aware of the just importance which is attached to an accurate observation of the first cases that occur on the appearance of an epidemic, with a view to judge of its mode of propagation, we made arrangements for instituting a special inquiry on the spot into every case of cholera that might occur immediately on receiving the report of it. We intrusted this investigation principally to Dr. Parkes, who had had considerable experience of cholera in India. The results appear to us to be interesting and, as far as they go, decisive. It must be observed that the cases of cholera in London were among the first that appeared in Great Britain, being only a few days subsequent to the first case reported in the port of Hull on board a vessel which had come direct from Hamburg.

A case of a suspicious character was indeed reported in the metropolis as early as the 17th of July; this was followed by another of a similar nature on the 31st of the same month, and this by a third on the 16th September. But setting these cases aside as not exhibiting unequivocally all the characteristic symptoms of Asiatic cholera, a case occurred on the 28th September with regard to the true nature of which there could be no question. Taking this as the first undoubted case, there occurred from this period to the 10th October (12 days) 28 cases. An analysis of these cases from Dr. Parkes' Report gives the following results:—

1. These 28 cases occurred in 10 different localities.

2. These localities were not near each other, but were situated at remote distances.

3. In not a single instance, as far as could be traced, had the first person attacked in one locality been in contact or proximity with a person previously sick in another locality, and in some instances such contact or proximity was impossible.

Thus the first case occurred (September 28th) at Horsleydown; two days afterwards (September 30th) two more cases occurred simultaneously, the one at Lambeth and the other at Chelsea; on the following day (October 1st) another case occurred in the City, in Harp-court, Fleet-street; the next day (October 2nd) a case occurred in the Justitia Hulk, at Woolwich; and three days afterwards (October 5th) the disease broke out simultaneously in the Dreadnought (hospital-ship) off Greenwich and in Spitalfields.

Diligent search was made to trace communication, direct or indirect, between the persons successively attacked in these several districts, but no evidence of it could be discovered; nor could such communication have taken place among persons having no kind of connexion or acquaintance with each other without an extraordinary series of accidents. But in two instances, if not in more, it is absolutely certain that no such accidental encounter could have happened. A convict was seized in the Justitia hulk at Woolwich on the 2nd of October, but the convicts at Woolwich, though they work in the dockyard, are watched by armed soldiers, and are allowed no intercourse whatever with other persons, while the Justitia herself lies about three miles below Greenwich, far apart from any other vessel except the convict hospital-ship, no merchant-vessel anchoring at this point of the river; so that, if cholera had been raging in Woolwich and had been prevailing in the vessels in the Thames above Woolwich, the origin of cholera in the Justitia would not have been attributable to contagion. But there was no cholera in Woolwich, or in the merchant-vessels in the Thames, and the only cases in London which were anterior in point of time to this in Woolwich were those at Horsleydown, seven or eight miles distant; Lambeth twelve or thirteen miles distant, Chelsea thirteen or fourteen miles distant, and Fleet-street ten or twelve miles distant. The occurrence of contact or proximity between these individuals and the convict at Woolwich may therefore be said to have been absolutely impossible.

So again in the Dreadnought hospital-ship a man was attacked on the 5th October. The Dreadnought, as has been just stated, lies off Greenwich three or four miles distant from the Justitia, with which it holds no kind of communication; it is also many miles distant from Horsleydown, Lambeth, Chelsea, and Fleet-street. This man had been on board the hospital-ship under treatment for another complaint a month before his seizure; he could not therefore have been in contact or proximity with any of the nine cases which occurred previous to his attack, and no sailor arriving from any infected place had been admitted with any complaint whatever for some considerable time. "By permission of the officers," says

Dr. Parkes, " I took the opportunity of inspecting the admission book, and learned that no sailor arriving in a ship from any port in or near which cholera was or had been prevalent had been admitted for any complaint whatever for a considerable time. The disease therefore could not have been brought on board by the clothes of some non-infected individual arriving from an infected ship."

The result of this observation is that cholera, at least in these first twenty-eight cases, did not arise and spread from contact or proximity with persons previously infected; and the greater weight must attach to this conclusion because it is founded on more trustworthy evidence than is commonly attainable on these subjects, inasmuch as, with a full knowledge of the importance of the inquiry, the most careful investigation into each case was immediately made on the spot.

A similar examination of the circumstances connected with the outbreak of cholera in the several towns of England in which it successively appeared, as far as the analysis has been completed, gives a like result.

The manner in which the disease spread through particular establishments in the metropolis, wherever an opportunity has been afforded of making a correct observation of facts, fully confirms the conclusion derived from this general experience. For example, from the 15th to the 22nd of October, 1848, fifteen cases of cholera occurred among the convicts in the Millbank Prison. With reference to these cases Dr. Baly, the medical superintendent of the prison, in his official Report observes :—

" It has seemed to me not uninteresting to inquire whether there were any facts to justify a suspicion that cholera had been introduced into the prison, and spread through it, by contagion. The man first attacked, John Fisher, had been between five and six months here. He occupied a separate cell in G ward, pentagon 6, and had no communication with any persons except the officer of his ward, the supervisor of his pentagon, the schoolmasters, the chaplains, and occasionally other prisoners of his own ward. None of the officers mentioned had been in any district where cholera prevailed. No prisoners had been received into the prison from Woolwich, and no stores from any places known to be infected.

"It is then extremely difficult to believe that this prisoner can have taken the disease even indirectly from any person already affected with it. The facts are equally opposed to the notion that it was communicated from him to the other prisoners subsequently attacked. No prisoner in the same ward, or even on the same floor of the pentagon in which Fisher was, has been attacked with cholera; and the successive cases have occurred, for the most part, in the most distant and separate parts of the building.

"In one instance two men occupying contiguous rooms, James Yeomans and Duncan Turner, were attacked, the one two days after the other; but this was in all probability an accidental circumstance, for the two rooms did not communicate directly with each other, and these two men had no direct intercourse; but there were several other prisoners in the cells with them, none of whom were attacked.

"In the infirmary, where there was the most chance of infection occurring—since, although a special room is set apart for the cholera patients, this room communicates with the other parts of the infirmary—none of the patients admitted for other diseases have been attacked with cholera; and, excepting the instances above referred to, the men attacked with cholera in the pentagons have all been in different wards, and where two cases have occurred in one pentagon this has been even on different floors. In each of these cases it appears to me there would be the same difficulty in accounting for the production of the disease by contagion as in the case of Fisher. After an unbiassed consideration of all the facts, therefore, I can but conclude that cholera has not shown itself to have a contagious character in this prison."

From the preceding evidence the conclusion is inevitable that the first cases of cholera in London, whether occurring in the metropolis generally or in particular establishments, did not originate and spread by contact or proximity of the infected with the uninfected. This observation is in accordance with the facts recorded with reference to plague by those who have had opportunities of observing the progress of this disease in the countries and cities in which it prevails as an epidemic, who state that on its outbreak the first cases are in like manner isolated; that they appear in localities remote from each other; and that there is no traceable communication between the persons first attacked.

But if the evidence is conclusive that the first cases of cholera in London did not originate and spread by contact or proximity, it is equally clear that contact or proximity, in the instances in which it certainly existed, did not communicate the disease. One proof of this, on a scale of unexampled magnitude is afforded by the case of the Tooting children. On the outbreak of cholera in the Tooting establishment for pauper children, upwards of 1000 children, impregnated with the poison of cholera, were dispersed over the metropolis. These children were variously located. In some parishes they were either entirely or in part received into the workhouse, and in others they were placed in separate houses in their respective districts. Of the children who were thus dispersed over this vast population, at a time when cholera was epidemic, and who in numerous instances were placed in direct contact or close proximity with the most susceptible subjects, no less than 300 actually became the subjects of the disease in its most violent form. According to the view of contagion, each group of children should have formed so many centres for the emanation and spread of the contagious influence; but instead of this, in no instance did cholera extend beyond the walls of the building in which the children were lodged; in no case did the neighbourhood become invaded by disease; and so remarkable was this exemption that no suspicion even was created among the inhabitants of the different localities of any attack having been caused by the presence of these children, although they were constantly visited by a numerous body of medical practitioners, and attended by a large staff of nurses and their assistants, and in many instances by the guardians also, who paid visits to the wards and dormitories.

It is true that in three or four of the places to which the children were removed, some few of the nurses or attendants were attacked; and these attacks, in ignorance of the real circumstances under which they occurred, might be regarded as instances of the communication of the disease by contagion. But, on inquiry, it turns out that in some of the establishments in which these attacks occurred cholera had broken out even before any case had appeared at Tooting; and that the premonitory symptoms of the disease were prevalent among the inmates at the very time when the Tooting children were received; and that in the other places the individuals seized were suffering under these premonitory symptoms when the children arrived, and, in some instances, considerably before their arrival. It is, therefore, more reasonable to attribute these attacks to the influence of the epidemic, than to contagion derived from the children.

From the attention which we have been able to give the subject, we regard the question whether any particular form of disease is in itself contagious as of much less practical importance than the settlement of the question whether, under given conditions, it is not capable of being rendered infectious. For if a disease be contagious, it is admitted that there are conditions which will heighten its contagious property; and if not contagious, it is equally admitted that there are conditions which will communicate to it an infectious character. There is a perfect agreement among medical authorities as to what these conditions are; and it is also generally admitted that some forms of fever are more liable to assume an infectious character than others; that even the same form of fever is more apt to become infectious at some seasons than at others; that there are conditions, as those of cleanliness and ventilation, which will nearly, if not entirely, deprive a contagious disease of its infectious property; and that there are other conditions, as those of filth and overcrowding, which in all climates and at all seasons are capable of changing mild into malignant fever, and of causing a form of fever which, under ordinary circumstances, is not communicable, to spread like a pestilence.

Practically, therefore, it is with these conditions that we have to deal, and there is no subject connected with the public health to which it is more important that attention should be directed than the conditions which tend to localize disease, and which are capable of communicating an infectious property to common diseases.

Perhaps one of the most remarkable exemplifications of the influence of such conditions on record is given by Dr. Ranken, in his Report on the Pali Plague, a malignant fever which, as has been stated, in 1836, ravaged some parts of Ragpootana, and which was at first believed in the country to be the true Egyptian plague, and to have been brought from the Levant to India in merchandize. So firm was the belief at that time in its contagious nature, and so great the dread of it, that orders were given by the authorities to isolate every town or village in the British territory as soon as it became affected, and to allot within every place in which it broke out an hospital for the infected, a depôt for the suspected, a place of quarantine for new comers, a depôt for infected or suspected goods, where they might be deposited until purified, and a residence for expurgators. These expurgators, carrying the sick to the hospital and the dead to their graves, disinfecting their houses and destroying tainted articles, were to do all the duties expected of persons bearing that designation in the East of Europe. Armed men, guarding the line of circumvallation to prevent ingress or egress, were to allow not even provisions to pass unless by authority of the quarantine officers, and in paying for them the inhabitants of the infected spot were to drop the money into a cup of water, from whence the sellers might take it without risk. By these means, enforced when necessary at the point of the bayonet, it was hoped to effect the timely separation, and prevent the contact of the sick with the healthy.

To arrest the progress of the disease at detached stations, a blockade was drawn around infected places, and "an impassable cordon of posts" was placed to intercept it on the frontiers, together with a preventive line of troops round the most exposed British stations, to exclude persons and goods coming from suspected quarters until they should undergo quarantine. Ninety miles of hilly district were to be thus guarded by two watchmen from each village, posted in a continuous chain along the whole frontier; and a thousand armed horsemen were to protect and guard 250 miles of sanitary cordon.

Yet after the termination of this pestilence, and when by order of the government of India a careful examination was made into its nature and progress, it was found that there was no evidence that it was plague, much less that it was plague imported directly or indirectly from Egypt or the Levant by specific contagion. The official report on the epidemic concludes with the following words :—"So many facts of concurring import apparently authorize the conclusion that the Pali disease, though fostered and rendered capable of propagation by the habits of the people, derives its being and strength from deleterious impregnations of the air, which, wherever evolved in unusual quantity by the operations of nature, or accumulated by misdirected art and the circumstances of locality, have aggravated common fever to a pestilence."

When the inhabitants of Pali, struck with terror at the visitation of the pestilence, fled from the city and sought refuge in neighbouring villages, they were said to carry the disease with them; for, wherever they took up their residence the plague shortly afterwards appeared; and this was conceived to be decisive evidence of its contagious nature. But the condition of the places in which these fugitives found shelter is thus described by Dr. Ranken :—

"The hut, or one of the same dimensions, which was the unwholesome den of four persons fifty years ago, now shelters six human beings within a space barely sufficient for the accommodation of one. These miserable habitations are often enclosed by an outer screen or wall, composed of the branches of prickly shrubs, bushes, &c., not only round the house as a defensive outwork, but into every crevice and corner where there may be the possibility of egress or regress either to man or animal. Glass to let in light or apertures to admit fresh air being unknown, the door, in order to keep out heat at one season and cold at another, is generally shut. The poor feel most at home in such dark places, with their children lying round them on the floor too much like hogs in a stye amidst their litter."

A similar description is given of one scene of the yellow fever's ravages to the eastward, which is said to be a fair representation of the whole field on which the pestilence prevailed. "Ventilation," says Mr. Shirreff, "so necessary under such circumstances, is all but absolutely prevented by high ruinous walls and by a thick grove of palm, mangoe, and other trees. In the village of Pakism, where the disease was still raging with peculiar severity when I visited it, might be seen numerous houses in which living beings, sick and healthy, were crowded into a space barely sufficing to contain them. I counted in the interior of one house of ordinary size 12 buffaloes, besides some calves and a pony, all but pressing on individuals labouring under different stages of the epidemic. Four of these sufferers were lying in two beds, and a fifth after some time was detected breathing his last in a place like a baker's oven. The pent-up putrid vapour (for it was not air) of this place nearly suffocated me, no attention having been paid to the commonest cleanliness. Seven individuals had already died out of this house from the epidemic; many other houses in the same village were similarly circumstanced.

"In another village which suffered much from the fever, before I could see several of the sufferers, I was obliged to break through herds of cattle which occupied the only ventilated parts of the houses, and perhaps was led to the innermost of a suite of cells, where I found them in all the distress arising from excessive heat, disgusting filth, and an ardent fever."

It is remarkable that, when the fugitives from the infected towns were refused admission into the surrounding villages, from the dread of contagion entertained by their neighbours, and when consequently, being unable to obtain shelter in these wretched habitations, they were obliged to encamp as best they could in the open country, the spread of the disease was immediately checked, and the sick recovered. Thus Dr. Keir states that, on visiting an encampment of refugees, amounting to about

400 souls, he found their position to be a mile from the village, where they were collected under a sort of temporary covering of grass, sticks, and any materials that could be collected at random: they had lost by the disease about 20 of their members before the move, but only one or two since. (*Report,* No. 10, p. 67.)

Mr. Russell says,—" When the fatal disorder began to spread over the sacred place, attacking all classes, two-thirds of the inhabitants, accompanied by their sick friends, left the town and encamped within a circle of two miles from the city, where they still remain; and in visiting several spots where hundreds were located, I found no sick." (*Report,* No. 33, p. 167.)

" I remember," says Dr. Ranken, " three occasions on which I had to treat infectious fever in native jails before contagion was thought of in this country. In one instance, another medical officer and I persuaded the magistrate to let a tent be pitched on the flat roof of the prison for the accommodation of the sick; and in a very few days exposure to the perflation of the free and comparatively pure atmosphere outside, stopped, or rather prevented, the farther propagation of the sickness. The explanation of facts of the same nature on a far greater scale is satisfactorily given by Sir John Pringle, and latterly by the late Dr. Jackson in his work on the Epidemic Yellow Fever of Spain."

Mr. Spencer gives an account of the outbreak of yellow fever in Moradabad jail from overcrowding, which assumed a malignant character and attacked the persons in attendance on the sick. No improvement occurring by removing the sick to larger wards and the attendants continuing to fall ill, the patients were removed into temporary choppers, erected under trees that sheltered from the sun, but allowed a free circulation of air. Here a manifest improvement occurred; the disease became more manageable, fewer persons were attacked, and the attendants were less liable to infection. On the rains setting in at the end of June it was no longer possible to keep the sick under choppers; the hospital was drained, whitewashed, and fumigated, and the men returned to it; but notwithstanding every precaution the disease again resumed its formidable character; the admissions were numerous, the attendants constantly fell sick, the mortality was excessive up to the cessation of the rains, when the sick were again placed in the open air under choppers, and in about a fortnight from that time the disease ceased to exist. (*Report*, No. 41, p. 196.)

Mr. William Shirreff, in describing an epidemic of a similar character in the Panipat and Rhotuck districts, states that the epidemic assumed great part of its fatal character from the foul, crowded, and ill-ventilated state of the villages and houses; wherever the disease prevailed with severity, there filth and want of ventilation were remarkable. "I believe," he continues, "from what I have seen, that under ordinary circumstances the disease is not infectious; but that when numbers of living beings are crowded together in a foul, ill-ventilated apartment, the air of the place is capable of reproducing the disease. A policeman employed at Panipat Kacheri, on returning from where the epidemic was prevailing, had the disease in its worst form, but of all his numerous comrades and others who were attending to him, fanning him, cleaning him, &c., not one was seized. The apartment in which he lay was open, clean, and well ventilated. The Panipat civil native doctor told me that he had frequently seen families in the city of whom only one suffered from the disease, though the individual may have had communication with the others. Of the six native doctors employed in treating the epidemic in the Panipat and Rhotuck districts, no one has been attacked by the fever. At Langer, none of the police who live in the well-ventilated and comparatively clean police-office, have been seized by the fever, though they must have had frequent communication with the numerous sick in that village. The facts upon which I found my opinion that, under particular circumstances, the fever is infectious are, that when one of a foul, ill-ventilated *mahalla*, or patriarchal house in which families related live, is seized, the fever spreads through nearly all the inhabitants, frequently proving fatal to every one. Peculiar locality does not account for this, as those houses in which all the inmates had died were often divided from one another by houses which had comparatively escaped." (*Report*, No. 46, p. 218 *et seq.*)

Dr. Ranken thus sums up the general result of Indian experience with reference to this epidemic. "The decrease and cessation of the sickness," he says, "is uniformly concomitant with the thinning of the population. The dispersion of the inhabitants is the most effectual measure that can be recommended for lessening the violence or stopping the spread of febrile diseases. If the distemper arise from a combination of circumstances, of which the principal is the accumulation of four or five persons in a dwelling sufficient only for one, the preliminary condition of cure, without which others are vain, is the four or five-fold enlargement of the space in which the people breathe always and sleep at night."

The conditions tending to localize disease, and to render it infectious among the people of Egypt, are similar to those described by the preceding writers as belonging to the populations of India.

Dr. Mead, a century and a half ago, in assigning the reason why Cairo is the birthplace and cradle of the plague, says,—"Cairo is crowded with vast numbers of inhabitants, who live poorly and nastily; the streets are narrow and close; the heat is stifling; a great canal passes through the city, which at the overflowing of the Nile is filled with water; on the decrease of the river this canal is gradually dried up, and the people throw into it all manner of filth, carrion, and offal; the stench which arises from this and the mud together is intolerably offensive, and from this source the plague, constantly springing up every year, preys upon the inhabitants, and is stopped only by the return of the Nile, the overflowing of which washes away this load of filth. In Ethiopia the swarms of locusts are so prodigious that they sometimes cause a famine by devouring the fruits of the earth, and when they die create a pestilence by the putrefaction of their bodies. The effluvia which arise from this immense quantity of putrefying animal substance, combined with so much heat and moisture, continually generate the plague in its intensest form; and the Egyptians of old were so sensible how much the putrefaction of dead animals contributed towards breeding the plague, that they worshipped the bird ibis from the services it did in devouring great numbers of serpents, which they observed injured by their stench when dead as much as by their bite when alive."

The sanitary condition of Egypt appears for the most part to have remained stationary up to the present day. The following descriptions relate to large classes of the existing population. "In Alexandria," says the Sanitary Report, "where the Arab population leave the ordure before their doors (as we have seen large classes of the lower population do in this country), where the dog is the only scavenger of the animal refuse (as the pig is in many districts in our towns), where those who have died of plague remain unburied for many days amidst the abodes of the living (as those who have died of fever often do in the poorest districts of this country), there, under the more powerful action of a burning sun, disease and death are proportionably rife, and, as shown by some returns of deaths in 1841, out of a population of 60,000 the deaths were 7017 (of which 1165 only were from plague), or more than one-tenth of the population. It is known, however, that in the well-cleansed and best streets inhabited by the European and fluctuating population, the proportion of mortality is not greater than amidst a similar population in the towns of Europe."

"The Fellah," says Dr. Hamont, in a communication presented in 1845 to the Academy of Medicine of Paris, "constructs his hut with mud, on the margin of stagnant water, where the bodies of numerous animals macerate and rot. Against it his neighbours erect a second, a third, so as to form a group of huts closely approximated one to the other, and to leave little or no interval for the circulation of air. In these miserable huts men, women, and children, half naked, lie mingled on the damp floor, from which, generally speaking, they are only separated by a rotten mat. Around these wretched habitations you tread on the recent excrements of men and cattle, on heaps of refuse, where famished dogs dispute the possession of the putrefying flesh of a cow, a camel, or an ox, frequently dragging the mangled intestines to the very threshold of the houses. As the Delta is a plain of an uniform level, in order to construct their habitations, the peasants are obliged to dig excavations, which they do in the immediate vicinity of their future residence. The pits thus formed are filled with water at each inundation of the Nile, which remains stagnant during the remainder of the year; millions of insects give life to them, and they soon become as repulsive to the smell as to the sight. Yet it is from these sinks of corruption that the peasants draw the water which they drink and use, and in them that they perform the daily ablutions enjoined by their religion. The Fellah himself, nearly naked, sows and works in the mud of the rice-grounds, near which he often sleeps. When his wife and children are not assisting him in the fields, they collect the excrements of men and cattle deposited near their dwellings, and mixing them with the muddy, fœtid water, work the nauseous compound, with their hands and feet, into small, round, flat masses, which they stick against the walls of their habitations to dry, and which they use as fuel. The air which the Fellah and his family breathe is thus perpetually tainted and corrupted by the noxious emanations proceeding from vegetable and animal substances in a state of putrefaction. It would seem as if every act of his life was destined to be the very reverse of what it ought to be, hygienically speaking. Around his residence he creates a focus of corruption so horribly offensive, that its proximity becomes painfully evident to the traveller long before he reaches it. Nor is the contamination confined to his own dwelling. In order to purify himself before he offers his daily prayers in the mosque, he visits an outer yard devoted to this purpose, and then washes himself in an adjacent tank of putrid water. The contents of these yards, where fifty or a hundred Mussulmen may be seen at a time, flow into an uncovered canal, which generally terminates in a large ditch in a public square near the habitations. This ditch is not closed, and never emptied. Its contents overflow, soak into the earth, and, like a black lava, penetrate everywhere into the roads and houses. It is easy to conceive how offensive the atmosphere must be in such a place during the hot months of July, August, and September; and wherever there is a mosque, such is the state of things. A stranger may always discover the mosque, in Lower Egypt, by attending to his sense of smell. The more fœtid the air becomes, the nearer is the mosque.

"In order still further to concentrate the pestilential exhalations which he generates about him, the Egyptian surrounds his village, constructed in a low, damp soil, with a heap of rubbish of all kinds, thus rendering the ventilation of the locality in which he resides still more difficult, and making the refuse which might fertilise his land an additional source of disease to himself. Cooped up in this disgusting retreat, he seems as if he had done his utmost to create for his own use a focus of disease and corruption, and to poison the valley of the Nile, in which Providence has thrown, with profusion, elements of conservation. Infested with vermin, he seldom changes his linen, and, as if his nose and mouth were not enough to absorb the mephitic air which he 'composes,' he is generally clothed in rags, or in a linen tunic, which leaves the greater part of the skin exposed."

We quote the following passage from the Report of the Academy of Medicine of Paris, in 1846, on Quarantine, to show the perfect unanimity of the most competent observers in different countries on the main points connected with this subject.

"At the present moment it is almost exclusively from Egypt that we have to fear the importation of plague. But if in the view of health we compare the different points of the globe acknowledged to give birth to the plague, we are amazed to see in Egypt, in spite of its fine climate, a miserable population inhabiting villages composed of filthy huts, unfit for human beings, living on spoiled seeds, unsound meat, and putrid fish; we are surprised to see even the towns, even Cairo, encumbered with cemeteries, and composed of houses built on sepulchral caves, where dead bodies lie mouldering. The same circumstances are to be met with at Erzeroum, a large town, having 50,000 inhabitants, built in a peninsula formed by the two northern sources of the Euphrates.

This city, where the plague arises spontaneously, is traversed by filthy streets; dead animals lie in them unheeded, every description of filth is thrown into them; the butchers kill animals in these streets, which are as unhealthy as they can possibly be.

"The same conditions are to be met with likewise on the banks of the Danube, and the want of rapidity in the current of that river produces the same effects as do marshes. On its banks the diseases which are common in all seasons frequently assume, after hot weather, a remarkably serious aspect. In the autumn of almost every year very dangerous intermittent fevers appear, and are soon followed by the plague, which is generally sporadic, but which in some years assumes the epidemic form. It is thus ascertained that in all countries where this disease has been observed to be spontaneous, it may reasonably be considered as arising from determined causes acting on a great portion of the population: these causes are—living on a marshy soil near the Mediterranean Sea, near certain rivers, the Nile, the Euphrates, or the Danube; living in houses that are low, not well ventilated, and where there exists superabundant accumulation of inhabitants, hot and damp air; the action of animal and vegetable substances in a state of decomposition; and lastly, great moral and bodily misery.

"All these generating causes being united every year in Lower Egypt, the disease is endemic in that country, where it is observed to assume the sporadic form every year, and the epidemic about every 10 years. Besides, if we consult history we shall find that during the reign of the last of the Pharaohs, during the 194 years of the occupation of Egypt by the Persians, the 301 years during which lasted the dominion of Alexander, the dynasty of Ptolemeus, and a great portion of that of Rome, Egypt was free from the plague. This absence of any epidemic for the long space of time during which good administration and the sanitary police of the country conquered the producing causes of the plague, justifies the expectation that the same means will be followed by the same results.

"Is the plague an epidemic disease, according to the usual meaning of that word?

"A disease is epidemic when in a given time it attacks a great number of persons. Epidemic diseases present characters by which they may be distinguished from those that are not so.

"1. There is a special march in their progress. Three periods are generally admitted—the commencing, the confirmed, and the declining or ending period. These often display neither the same symptoms, the same alterations, nor the same severity.

"2. During the reign of an epidemic disease other distempers are less frequent and bear the stamp of the predominant affection.

"3. Whilst an epidemic disease is raging it seldom occurs that the persons who retain their health do not feel more or less the general influence.

"4. Epidemic diseases often return and disappear at the same season of the year, and last generally the same length of time.

"5. An epidemic disease is often preceded by other affections, offering various degrees of severity, which are more or less general and seem as it were precursors.

"All these characters having been observed in the plague when it has raged with violence in Africa, Asia, and Europe, it ought to be considered as an epidemic disease.

"The inoculation of blood drawn from the vein of an infected person, or the pus taken from a bubo, only gives equivocal results; the same attempt made with serosity taken from the phlytenæ of a carbuncle of the same nature always failed to give the plague. It is consequently not proved that the plague can be transmitted by inoculation even within the focus of the epidemic."

That a disease so terrible as the Egyptian plague, when it exists in its intense form, should occasionally decimate the inhabitants of places in such a sanitary state as that which has been described, as the Pali plague destroyed the miserable inhabitants of Ragpootana, can excite no surprise; the conditions are similar in both countries, and similar results must be expected.

A few centuries ago the sanitary condition of England was so little superior to the present state of these countries, that it was frequently visited by epidemic diseases similar in character and scarcely less mortal. Even during the last century a deadly form of fever, Typhus Gravior, scarcely to be distinguished from plague, frequently prevailed as an epidemic. But for the last thirty or forty years not a single case of Typhus Gravior, answering to the description of the writers of that day, has been witnessed in London; this malignant form of disease has disappeared under the improved conditions of increasing civilization, and has given place to the Typhus Mitior, or the common typhus of the present day. But even in this, its mitigated form, typhus is represented as presenting a type not essentially differing from the plague of Egypt as it now ordinarily exists. Dr. Heberden, writing at the beginning of the present century, says that the annual pestilential fever of Constantinople very much resembles that of our gaols and crowded hospitals, and is only called plague when attended with buboes and carbuncles; and that the fever which in unfavourable seasons ravages particular districts and localities in our own country is almost as severe as that which prevails in the bad quarters of Constantinople. Among those who have had opportunities of personally observing both diseases, the opinion is almost unanimous that the plague of the torrid is the typhus of the temperate, climate. "Neither in ancient times," says Dr. Ranken, "nor when most known in Europe, was plague conceived to be essentially different from other febrile diseases. The word (λοιμος) which the older Greek authors use for it was applied generally to any deadly epidemic, as the Latin word *pestilentia* still is. By most of our ablest writers, and nearly all the forerunners of improvement, who reject precedent and form their judgment on direct evidence, plague is maintained to be Typhus Gravissimus, or a fever of that well-known type in its severest form. Such observers and reasoners ascribe the peculiarities of plague to an aggravation of the causes of common fever, and of the predisposing circumstances which increase their effect." And so likewise it may be remarked that the most careful observers of cholera are satisfied that it is nothing else but an intense form of fever.

Such predisposing circumstances as we have referred to are but too common in our own country at the present time, often causing typhus to locate itself in particular towns and districts and to devastate them as a pestilence. It has been justly said that the room of a typhus patient in one of the courts of our back lanes or streets, small, heated, overcrowded, with no perflation of fresh air, is perfectly analogous to that of a plague-house on the margin of a stagnant pool in Ethiopia full of the bodies of dead locusts; the poison generated in both apartments is similar, and the main difference is in its quantity and potency.

A few centuries ago plague appears to have been not unfrequent in England, as it is now after certain intervals constantly epidemic in Egypt: and in confirmation of the representation made above that there is an analogy between typhus and plague, it may be stated that Dr. Laidlaw, who has resided for ten years at Alexandria, and who for three years had the charge of the plague-hospital of that city, on recently paying a visit to the London Fever Hospital, pointed out cases—and those by no means the most severe that crowd its wards—which he declared would at Malta certainly have been sent to the lazzaretto as cases of confirmed plague.

Dr. Laidlaw's description of the habitat of plague in Alexandria closely resembles Dr. Ferrier's description of the habitat of typhus in the lower districts of Manchester. Dr. Laidlaw states that his first act on taking possession of the plague-hospital, from which, under a false theory respecting the nature of the disease, it had been the custom to exclude the fresh air, was to break the windows of the wards as the only means of obtaining immediate ventilation. On visiting private patients in the infected districts of the city, he took care, he says, to have the doors of the houses thrown open before he entered, and was often obliged to break the windows of the apartment with his stick, to admit air to his suffering patients. Precisely similar is the description given of the custom of Dr. Ferrier, who relates that, on visiting the fever-nests of Manchester, it was his practice to use his walking-stick to break the windows of the rooms in which the sick were lying.

Something of the same kind was done when typhus broke out in the Eastern Asylum of the Houseless Poor, in this metropolis, in 1831. Panes were removed from the windows, and bricks were taken out from the walls of the building to admit air. "I once went into a room where a woman was lying in typhus fever," says Mr. Bowie, "a small underground apartment, the window of which opened into a confined area or yard. To this situation she had been confined several days: the window and door were closed; none of the excretions had been removed. On entering the room I was almost suffocated; the stench was unbearable. I rushed to the window, and threw it open before I could speak a word. After paying my visit, when I got into the street I was seized with headache, giddiness, and sickness. I was so ill the next morning that I was unable to rise, and was confined to bed for several days afterwards. No dead locusts putrefying in a stagnant pool in Ethiopia could have produced a worse smell, or created a more poisonous atmosphere, than existed in that room."

There cannot be a doubt that if a nurse had attended this patient in this room, or if a family of children had lived in it, they would have been in imminent danger of being seized with typhus. Few persons, indeed, could resist the effect of such an atmosphere if breathed during the hours of sleep; and many individuals have been brought to the Fever Hospital labouring under severe fever produced by passing a single night in such a room. In the present instance, the poisonous nature of the atmosphere was sufficiently intense to produce a transient attack of fever in the medical attendant, who remained in the room probably not more than five minutes, and who was in the habit of visiting rooms of the same description. But the influence on the inmates, nurses, and medical attendants of the atmosphere of the common rooms of our poor in the close, crowded, and filthy districts of all our towns and cities, is precisely the same in nature though not so extreme in degree. These rooms are generally filthy, and always unventilated; and their pent-up air is rendered noisome often by the long retention in them of the evacuations of the patients, as well as by the poisonous exhalations from the lungs and skin, which, having no exit, become highly concentrated. A medical man enters such a room; remains in it during the time which is necessary to examine and prescribe for the sick, and to give instructions to the nurses and attendants; in the anxiety of his professional duty he forgets the precautions due to himself; he breathes this contaminated air in all states of health, perhaps when weakened by indisposition or exhausted by fatigue; at last he is seized with the disease, or, as it is commonly termed, he catches the fever. In like manner the Catholic priest, as too frequently happened during the prevalence of the recent epidemic typhus at Liverpool, who receives the dying confessions of the sick, whose ear is commonly close to the mouth of the confessing person, and whose visit is often protracted considerably longer than that of the medical practitioner, suffers proportionately in a greater degree even than the latter. But if these offices were performed in the open air, where the poisonous exhalations are immediately diluted, and by that dilution destroyed, no injurious effect would happen. In point of fact, in various fever hospitals, where due attention is paid to ventilation, and where care is taken to prevent the wards from being overcrowded, such offices are daily performed by nurses, medical students, physicians, and priests; and many years sometimes pass away without the occurrence of a single case of fever among such officers. The same is true with regard to the relatives of the sick who come to visit them in these wards, and who sit upon their beds, touch their bodies, and handle their clothes without sustaining injury.

There has been much confusion of terms in respect to the use of the words contagion and non-contagion. We have had instances of professional men who avowed their belief of the contagiousness of typhus, and stated that they had experienced it in their own persons. When asked for the evidence on which the belief was founded, they have usually related some circumstances such as those above described, showing, not the contagiousness, but the infectiousness of the disease. Contagion is a term applicable to a different set of circumstances. According to the hypothesis of contagion, no matter how pure the air, no matter what the condition of the fever ward, if the physician only feels the pulse of the patient, or touches him with the sleeve of his coat, though he may not catch the disease himself, he may communicate it by a shake of the hand to the next friend he meets; or that friend, without catching it himself, may give it to another; or if the physician wash and fumigate his hand, but neglect the cuff of his coat, he may still convey the deadly poison to every patient whose pulse he feels during the day. If this were so, the track of a general practitioner who attended one patient labouring under a specific epidemic disease would be marked by the seizure of the rest of his patients; if it were true of cholera and typhus, some members of this Board must have fallen by these diseases, who from morning until night received inspectors that came from places where these epidemics were rife; and if any disease of common occurrence really possessed such powers of communication and diffusion, it is difficult to conceive how it is that the human race has not been long since extinguished. To assume the method of propagation by touch, whether by the person or of infected articles, and to overlook that by the corruption of the air, is at once to increase the real danger, from exposure to noxious effluvia, and to divert attention from the true means of remedy and prevention. It is not in human power to take from any disease the property of contagion, if this property really belong to it; but it is in our power to guard against and prevent the effects of any contagion, however intense; and it is equally in our power to avoid communicating to common disease an infectious character, and aggravating it into pestilence.

We think it may be useful to recall attention to the opinion of medical authorities as to the narrowness of the range of contagion and infection. Strictly, contagion, as the word implies, is capable of being communicated only by actual contact; while the influence of infection, as far at least as regards the diffusion of the exhalations of the sick into the surrounding atmosphere, is represented to be limited to the distance of a very few yards.

Dr. Russell and Mr. Howard the philanthropist, as the general result of their observation of the plague in the countries in which it is most prevalent, state that the effluvia of patients in the plague are incapable of infecting at the distance of a very few yards.

Dr. Carmichael Smith, in a letter to Dr. Perceval, of Manchester, says—

"Respecting the limited sphere of contagion I said the less, as I considered it a matter so well ascertained, and by such a body of evidence, as required no additional proof. The sphere of deleterious power is, in general, so extremely limited, that there have been, and still are, some physicians who believe they are only propagated by contact."

Dr. Perceval says,—"Even a lazaretto for plague itself is found by the fullest experience to produce no contamination of the air capable of affecting the health of those who reside near it."

Sir William Pym, Inspector-General of Quarantine in England, states in his work published two or three months ago—"A sentinel at the door of a pest-house in the centre of a town may be safe against the plague, which is communicated only by contact or by very near approach."

On the faith of this narrowness of the sphere of contagion, Dr. Haygarth, in the year 1796, first ventured to open fever-wards in a common hospital. In a letter to Dr. Percival, Dr. Haygarth says,—"This institution arose from the speculations which you know had engaged my attention on the nature of contagion. Numerous facts having proved that a person liable to receive the small-pox was not infected by a patient in the distemper when placed at a very little distance, I next considered the nature of the contagion which produces putrid fevers; I soon discovered that their infectious atmosphere was limited to much narrower extent than even the small-pox.

"On these considerations, I ventured to propose the admission of typhus fever into the attic storey, on one side of our infirmary, to be separated into two wards. From the experience of a dozen years, I am warranted to maintain the safety of this measure. During this period it never was suspected that infection has been communicated to a single patient in other parts of the house."

There is decided evidence that when fever patients are distributed among other patients in common hospitals, they do not communicate fever to patients in the adjoining wards or even beds.

Dr. Monroe says,—" Not being able to procure particular houses for the sick affected with fever of the Coldstream and for the Grenadiers, I distributed them through the different hospitals at hand then in town, when the contagion ceased, and by their being thus scattered we lost few in proportion to the first and third regiments, and the disorder did not spread."

In his evidence before a Committee of the House of Commons, Dr. Roberts, senior physician of St. Bartholomew's Hospital, states, " That when persons in fever are distributed through the wards indiscriminately, as long as proper ventilation is kept up, the disease is not communicated to the other patients."

Dr. Currie, of Liverpool, states, that " Patients in fever were admitted in this manner, that is, in two wards with other patients, for five years and upwards; and by a list taken from the register, it appears that 213 fever cases passed through these wards during this interval. In this space of time there was no instance of the contagion being communicated to other patients of the house.

" The only access to the fever-wards of the infirmary is through the great staircase common to the whole building, and immediately over them is the nursery, at present inhabited by 60 children. Notwithstanding these circumstances, I have the authority of Dr. Rutter, Dr. M'Cartney, and Dr. Renwick, for saying they have no reason to believe that in a single instance the contagion has been communicated from them to the other parts of the building."

Dr. Robert Percival, professor of chemistry in Trinity College, Dublin, says,—" The building which since November, 1792, has been applied to the uses of a fever hospital, is situated in a very close part of the town. There is no opportunity for free ventilation, except on one side, where some decayed houses have been pulled down. Habitations are crowded on the rear. The space between the front of the hospital and of the opposite houses measures 27 feet. I have made diligent inquiry from the officers of the house, two of whom have been there from its first establishment, and do not find that there is any reason for supposing or even surmising that infection has been propagated to the neighbourhood. They have never heard of any complaint of the kind, nor have I."

Dr. Leeson, physician to St. Thomas's Hospital, in his examination by the Sanitary Commission, says,—"Our present practice, contrary to that of former years, is to place our typhoid cases indiscriminately among other patients, and we then depend upon good ventilation for the protection of the other patients. We introduce so much pure air into the wards, that we largely dilute, and thus pass off, those noxious exhalations, whatever they may be, which in close crowded chambers would no doubt have been the occasion of spreading the disease."

"In complete accordance with these views," says Dr. Arnott, "as to the efficacy, however the disease may have arisen, of the ventilation which will sufficiently dilute the aërial poison, Dr. Christison, the distinguished brother professor of Dr. Alison, and who has been similarly labouring in the midst of the typhus in Scotland, says in his late treatise on fever, published in the *Library of Medicine,* at page 159, that, 'So far as minute observation of several violent epidemics (in Edinburgh) during the last twenty years can determine the point, moderate precautions will render the infectious atmosphere inert. Cleanliness and ventilation will speedily extinguish any epidemic.' And he gives the striking illustration of the effect of different degrees of concentration of the poison observed in the wards of the Edinburgh hospitals, and which, if fever patients were admitted only under a certain proportion to the other patients, the fever did not spread, but if beyond that proportion, the persons about them were seized, and very exactly in the ratio of their exposure to the infection, the nurses preceding the clerks and house surgeons, these the dressers, and these the general students and physicians; and it was remarked that none of the persons so attacked, when removed to their private dwellings, communicated the disease to their attendants."

These views do not accord with the belief still entertained by some, and formerly entertained by many, that the exhalations from the living body, whether in a state of health or disease, but particularly in a state of disease, are equally and even more noxious than the poisons generated by the decomposition of vegetable and animal filth, and that both are capable of the like diffusion. There is reason to believe that miasms apparently connected in some way or other with the decomposition of vegetable and animal matter are capable of permanent suspension in the air; the virus of cholera, for example, having travelled from India to Europe, and thence to America, and spread over the greater part of the habitable globe; but such authorities as Drs. Haygarth, Percival, Ferrier, Carmichael Smith, Currie, Russell, Roberts, Arnott, Christison, and many others, deny that exhalations from the living body are capable of permanent suspension in the atmosphere, or that they can be conveyed unchanged through pure air to great distances. They regard it as established by an indubitable body of evidence, that the moment these exhalations come in contact with the external atmosphere, they are diffused through it; that by such diffusion their injurious properties are destroyed, and that, though when pent up in close unventilated rooms they may acquire permanence, concentration, and virulence, yet, when they once pass into the ocean of air, they disappear as a single drop of rain is lost in the ocean of water. And these authorities view the property thus possessed by air to neutralize and destroy these exhalations as a provision of nature for our well-being.

If indeed the emanations thrown off from the living body formed permanent and powerful poisons, like miasms connected with the products of decomposition, and if they were, like such products, capable of being conveyed unchanged to great distances, we should be able to live only in solitude; we could never meet in society, for we should poison each other; the first symptom of illness would be the signal for the abandonment of the sick, and we should be compelled by a due regard to self-preservation to withhold from persons afflicted with disease every kind and degree of assistance that required personal attendance.

Happily, we are not so constituted, and the evidence that has been adduced of the narrowness of the sphere even of the most virulent contagion, shows the groundlessness of the alarm sometimes entertained respecting this dreaded agent, while it points to the certain means of destroying it. The London Fever Hospital is separated from the Small-Pox Hospital only by the space of between thirty and forty feet, and the windows of the wards of both establishments are immediately opposite each other; yet there is no instance of the communication of small-pox to the typhus patients, nor of typhus to the small-pox patients; nor of either disease to the convalescent, or to the official inmates of the adjoining establishment. There does not appear to be a single instance on record, in any country, of the extension of infection beyond the walls of an hospital, or even of a lazar-house, so as to injure in any manner the nearest inhabitants.

But though from the facts which we have now presented, and the connection of facts which we have endeavoured to indicate, it appears that modern experience and research have shed considerable light on the origin and progress of epidemic diseases, yet there are still some circumstances connected with their propagation which the present state of our knowledge does not enable us to understand, and which therefore appear to us as difficulties.

These cases are sometimes termed exceptional; but they are only apparent not real exceptions; as in all other departments of human research, they are merely indications of the imperfection of our knowledge, and advancing science will unquestionably one day so elucidate these very exceptions, as to render them additional confirmations of the true conditions.

In the mean time we would submit the following considerations as helps to the elucidation of two of the main difficulties.

The first of these difficulties is the apparent capriciousness of epidemics in the course they pursue in individual instances; but especially with reference to particular places which they allow to remain free from attack. On the whole, their course is regular, often nearly uniform; traversing as they do, after an interval of years, the very same zone, and going back to the same countries, districts, cities, streets, lanes, courts, houses, and even rooms; but in individual instances there is occasionally an apparent capriciousness, particularly in the places they pass over unassailed. During the last six months, for example, cholera has made attacks upon nearly one hundred different places in England. When these places are carefully examined, the conditions favourable to their invasion are uniformly found; but in the near neighbourhood are places with conditions apparently just as favourable, that escape. Why do these latter escape? Probably a closer examination would show that the conditions of these places are not the same, and future observation may lead to a knowledge of the conditions that are invariably present. There is also good reason to believe that there are partial and local accumulations of noxious miasms, determined by the action of physical agents according to fixed laws, though science has hitherto given us no clear insight into those laws. But referring to the action of two of those physical agents only, namely, electricity and heat, it is justly observed by Dr. Ranken that—

"It does not appear more difficult to conceive the irregular and unequal dispersion of hurtful exhalations over limited spots, or wide tracts of country, in masses of varying density, with corresponding malignancy, than to be convinced of similar inequalities in the distribution of clouds and fogs which we witness daily. These phenomena of vapour and the effects of malaria, apparently governed by laws in many respects similar, are both facts in meteorology, which, although philosophy has not yet elucidated, reason and experience cannot refuse to acknowledge."

It is conceivable that under the action of these and similar physical agents there may be generated a peculiar force which may cause those noxious miasms to traverse tracts of country in determinate directions and to accumulate in particular localities. In order to form any tolerable conception of the extended yet definite course both of influenza and cholera it seems to be necessary to assume the existence of such a force. "It is not unreasonable to suppose," says Dr. Parkes, "that some moving force, altogether independent of the bodies of men, may have driven particles of cholera-poison into these (the infected) localities; for certainly there has been some power which, independent of human intercourse, and in opposition occasionally to winds, has driven this disease from the steppes of Tartary to the English shores."

If we give up the doctrine of contagion being the principal agent in the spread of epidemic diseases, another difficulty is the breaking out of such diseases in a place previously healthy, immediately after the arrival there of an infected person, or of a large body of persons coming from an infected district; and the occasional seizure of nurses and others in close attendance on the sick. If it be said these events rarely happen, the inquiry still recurs, why do they ever happen?

Often, no doubt, these occurrences are mere coincidences. This must have been the case, for example, with the sergeant of the Grenadier Guards, who, in 1782, was believed to have carried influenza from London to St. Albans. "This soldier visited London on furlough when the disease raged there. He returned to St. Albans in a few days infected, and communicated the disease to the people in whose house he had his billet. It was the first appearance of the disease there, and then spread rapidly all over the town." No one now believes that the return of this soldier from London to St. Albans had any real connection with the outbreak of influenza at St. Albans; yet this is precisely the kind of cases recorded in the official reports of the Local Boards of Health in England in 1832, and relied on to show that "the first case of cholera which occurred in their respective districts had been either directly imported from, or was traceable to, an infected community, and that the disease immediately spread from these first cases to one or more of those about them, and from these last to others."

It is not unreasonable, however, to suppose that a single infected person, and much more a large body of infected persons localizing themselves in the midst of a population already predisposed to disease and actually under an epidemic influence, may act upon that population zymotically, that is, as the leaven that sets in action the fermenting mass. "It is difficult," says Dr. Sutherland, "to obtain satisfactory experimental evidence, but I have an opinion, founded on the result of a great number of observations, that—1. A healthy person, sleeping for a single night in a locality where cholera has localized itself, may return to a healthy locality and take cholera and die, and no one else suffer. 2. If there be a slight epidemic influence present, perhaps one or two persons in the house may suffer. 3. If the influence be still stronger, a few cases may happen in the neighbourhood, and that without any communication with the infected house; and should the epidemic influence increase in intensity, these dropping cases may be fresh centres * from which the disease may spread with rapidity. I look on the poison which propagates cholera in an epidemic atmosphere as being truly *zymotic* but not *contagious.* Why may it not be the same with other pestilences?"

It is also important to bear in mind, that during the prevalence of an epidemic atmosphere, that is, at a time when the whole population of a district or a kingdom is habitually breathing an unwholesome medium—predisposing to disease, yet too much diluted to produce it unaided—a slight additional morbific influence is sufficient to cause active disease. It has been already shown that a prevalent epidemic destroys, in a great degree, all other diseases, by assimilating them to its own nature. Under such an epidemic influence the first spark of fever which casual fatigue, the exhaustion of nursing or of broken rest, want, inebriation, or the more common depressing accidents of life may elicit, will be sufficient to induce active disease, and such disease will certainly assume the form of the prevalent malady, whatever that may be. In this way we may understand how nurses in attendance on the sick may be readily attacked by the prevailing disease, without resorting to the supposition of contagion ; more especially if, as already fully explained, considerable numbers of the sick are crowded together, and if the most perfect ventilation is not maintained night and day. The power of the emanations of the human body even in health, and much more in sickness, to corrupt the air, has, even by the educated classes, never been sufficiently attended to. Haller reckoned that eight pounds of excrementitious matter escaped from the skin and lungs in a single person every twenty-four hours. Modern physiologists give a somewhat lower estimate ; but Dr. Southwood Smith has shown, by direct experiment, that under peculiar circumstances, as during exposure to high temperatures, the body loses in weight, by the discharge of these excrementitious matters, upwards of five pounds in a single hour.

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* Perhaps in everybody affected with cholera there has been a gradual and progressive accumulation of cholera poison; such a body may, it is conceivable, again give out the poison it has accumulated, and in this manner actually increase the amount of poisonous matter in its immediate neighbourhood.

Dr. Angus Smith has also shown, that when the vapour which condenses on the walls and windows of a room in which large numbers of persons are assembled is examined, it is found to be impregnated with animal matter in a high state of putrefaction. The effect of respiring over and over again air holding in solution such noxious animal matter, is commonly experienced to be headache, giddiness, languor, nausea, and vomiting ; and if the breathing of such air be long continued it may poison the blood to such a degree as to produce fever. But if the exhalations from persons in health are capable of producing this result, what must be the danger of breathing the air of a close room, in which numbers of persons are crowded together, labouring under such diseases as typhus, plague, and yellow fever? The predisposed or susceptible cannot, as has been stated, breathe such a pestilential atmosphere, even for a short time, without the most imminent risk ; but if they continue to breathe it uninterruptedly night and day, and perhaps in a state of anxiety and exhaustion, is it necessary, should they be attacked with the prevailing malady, to resort to the supposition of contagion to account for the event?

With reference further to all cases that appear to be exceptional, it is of great importance to ascertain that they are really exceptional, and not to admit any case to be so without rigid examination. Ample experience has proved that nearly all the statements that are commonly made with regard to cases of this description are mere unintentional falsehood. It is no easy matter to observe a fact of the kind in question; the sources of error are numerous, and generally not obvious, and no one who is not a skilful and practised observer can be expected to detect them. No such alleged fact should be admitted as evidence unless it fulfil rigidly all the conditions of the strictest investigation. But for exceptional cases we might generally read unexamined cases. Of all such cases that have come to our knowledge, so large a proportion have turned out, upon examination, to be no exceptions whatsoever, as to warrant the presumption that none were so. Thus, on the occasion already adverted to, of the distribution of the Tooting children, they were alleged to have communicated cholera to some of the nurses at the places to which they were sent. Had one thousand typhus instead of one thousand cholera cases been so spread, we could not but have been aware from the probable defective condition of some of these establishments, though less defective than the place from whence the children were taken, that considerable risk was incurred from infection, wherever the medical attendants and others failed in enforcing and carrying out proper ventilation, and so on. Cases of cholera, caused by infection, would have been consistent with the observations we have made with relation to typhus. But it turned out on inquiry, that before the arrival of the diseased children, the nurses had been labouring under premonitory symptoms, showing that they had been previously infected. These cases were all cited as evidence of the contagiousness of the disease; whereas, had they been well founded, they would only have been evidence of its infectiousness. But if, after all, cases should occur which, after the best examination that can be given, appear to be truly exceptional, they must be referred to the imperfection of our knowledge, and, however unable we may be to explain them satisfactorily, our opinion and practice must be determined by the preponderance of evidence and not by these isolated occurrences, which, as they suggest interpretations opposed to large and general observation, are probably misleading, and the whole conditions of which are confessedly not known.

In the present state of popular opinion we have deemed it requisite to enter into this detailed consideration of the general subject of contagion, because it appears to us that in proportion as undue weight is attached to this dreaded agent the effect is mischievous; since, as we have elsewhere urged, "it diverts attention from the true source of danger, and the real means of protection, and fixes it on those which are imaginary; creates panic; leads to the neglect and abandonment of the sick; occasions great expense for what is worse than useless; and withdraws attention from that brief but important interval between the commencement and the development of disease, during which remedial measures are most effective in its cure."

We have also thought it necessary to examine the questions of contagion and quarantine apart from each other, because there are points of obscurity, and therefore grounds for controversy, which, in the present state of our knowledge, may be reasonably considered as belonging to the former, that do not attach to the latter. The inquiry with reference to quarantine, indeed, is simple, and lies in a narrow compass. The sole question to be determined is, whether or not it accomplishes, or is capable of accomplishing, its professed object, and this is a mere question of evidence and experience.

The object of quarantine is to prevent the introduction of epidemic diseases from one country into another, and the agency which it employs for this purpose is the isolation of the sick; the detention of, and the placing under inspection for a given period, persons who come from an infected country or district, though they may not be actually sick; and the purification of articles of commerce presumed to be capable of imbibing and conveying pestilential virus, before such articles are landed and dispersed.

It appears to us that facts and observations have been already stated which place beyond all reasonable doubt the utter inutility of this system.

If there be any truth in the preceding representation, that epidemic diseases are universally and inseparably connected with an epidemic atmosphere, the question is at once decided. Quarantine can exercise no more control over this epidemic atmosphere than over the electricity and temperature of the common atmosphere, and the direction and force of the wind.

If it be true that epidemic diseases, such, for example, as influenza and cholera, traverse the globe in determinate courses or zones, and often spread from country to country, and through the vast populations of their great cities, in single weeks, and even days, it must be futile to array such a machinery as that of quarantine, that is to say, a vessel placed at the entrance of one or two seaport towns, a line of soldiers guarding a few miles of the frontier of a particular country against morbific agents, which pursue their course like the blight that destroys the vegetation of a country in a night, and which extend their influence over the greater part of the habitable globe.

If it be true that the epidemic influence precedes the actual outbreak of epidemic disease—that that epidemic influence is present in a country, creating a predisposition or susceptibility to disease before the epidemic appears in its true and recognised form,—quarantine must be futile, because, before it takes its precautions or erects its barriers, such as they are, the epidemic is already in the country busily in action, vitiating the blood of the most susceptible of the population, and preparing the way for its general attack.

If it be true, as ancient and modern authorities are agreed, that, without the essential preliminary of an epidemic atmosphere on the spot, foreign contagion is inert, and that, unless both concur, no pestilence ensues, quarantine under any circumstances must be useless ; for in the absence of an epidemic atmosphere it must be useless, because then no disease will spread beyond the individual affected; and with the presence of an epidemic atmosphere it must be useless, because then the disease will spread wherever the infected atmosphere goes and finds favouring conditions.

If the preceding principle be true, it must be futile to place vessels coming from infected countries in quarantine, unless those vessels are capable of bringing with them an epidemic atmosphere, and unless quarantine can control such an atmosphere when imported; and the uselessness of this procedure will be placed in a still stronger light when recent experience as to the comparative insusceptibility of Europeans, though resident on the spot, to plague itself is considered.

From a table drawn up by Dr. Aubert Roche, and quoted by Dr. Gavin Milroy, it appears that during the great plague at Alexandria, in 1835, the French, English, Russian, and German residents in that town, who were exposed to the epidemic influence in its full intensity, suffered in the proportion only of 5 per cent.; whereas the Arab population suffered in the proportion of 55 per cent.; the Malays in the proportion of 61 per cent; and the negroes and Nubians in the proportion of 84 per cent.: that is to say, falling upon the several populations in close proportion to their general sanitary condition; the attacks being the lowest amongst the Europeans, who live in airy and better-conditioned houses; and the most severe upon the Nubians, whose condition has been described. What then would be the amount of danger to a British community in England from plague-virus imported from Alexandria in a ship, when all the European residents taken together, rich and poor, living at Alexandria during this prevalent and mortal epidemic, suffered only in the proportion of 5 per cent.? An inspection of the following table, the figures of which it is justly observed by Dr. Milroy carry with them their own signification, will help to show the real groundlessness of the danger from which it is the object of Quarantine to protect the country.

TABLE showing the relative Mortality among different Races during the Plague at Alexandria in 1835.

						per cent.
Negroes and Nubians	lost	1,528	out of	1,800	=	84
Malays	,,	367	,,	600	=	61
Arabs, not soldiers	,,	10,936	,,	20,000	=	55
Greeks	,,	257	,,	1,800	=	14
Jews, Armenians, and Copts	,,	482	,,	4,000	=	12
Turks	,,	678	,,	6,000	=	11
Italians, and others from the South of Europe	,,	118	,,	1,600	=	7
French, English, Russians, and Germans	,,	52	,,	1,000	=	5

If the great practical truth, taught by modern investigation and experience, be, that the only real security against any kind and degree of epidemic disease is an abundant and constant supply of pure air, the prevention of overcrowding, and the dispersion of the sick; and if, as is generally agreed, confinement in a foul atmosphere can convert common fever into pestilence, and ventilation and dispersion can dissipate any contagion, then quarantine must be not only useless but pernicious, since the invariable effect of quarantine as hitherto practised in all countries has been the congregation and confinement of the sick and of those who, though not actually sick, are suspected to have in them the seeds of disease, requiring only a few days or hours for their development,—the congregation and confinement of such persons in a limited space, often in a filthy ship and an unhealthy locality, and always under circumstances calculated to excite apprehension and alarm—conditions in the highest degree favourable to the generation and spread of disease: it follows that quarantine, instead of guarding against and preventing disease, fosters and concentrates it, and places it under conditions the most favourable that can be devised for its general extension; and therefore must not only fail to accomplish its object, but tend to produce the very calamity which it endeavours to prevent.

The manner in which quarantine deals with articles of commerce, assumed to be capable of imbibing and transporting pestilential virus, with a view of preventing the importation of pestilence by means of such virus, is in no degree more rational or more in accordance with the knowledge of the time.

Quarantine still assumes that epidemic diseases can be transmitted from country to country by raw material and manufactured goods; that the plague of the Levant, (Typhus gravissimus), which has now disappeared from this country for nearly two centuries, and while even that form of fever which seemed closely to approach it (Typhus gravior) has been banished for half a century by the improved circumstances of the population, may nevertheless be imported in its full intensity in ships from Egypt by articles of merchandize.

With a view of preventing such a calamity, it directs that all articles assumed to be capable of imbibing this pestilential virus shall be aired and purified, and it appoints a staff of officers for carrying this system of purification into effect.

It is universally agreed that the only proof of the presence of pestilential or other virus is that it actually produces disease. In the present instance the first action of this virus, if it really existed, must be presumed to be upon those who are immediately and directly exposed to it, namely, the officers whose business it is to open and expurgate the infected goods. What, then is the result of experience as to the action of this virus on those officers? That at no season of any year in any country has a single person among them been known to be attacked by pestilence, or by any other form of disease which has ever been surmised to be imported or of foreign origin. By official Reports from Rochester, Portsmouth, Falmouth, Milford, Bristol, Liverpool, and Hull, received by the Committee of the House of Commons appointed to inquire into the validity of the doctrine of contagion in the plague, in 1819, it appears that no case of plague has occurred at any of these ports in any vessels, or among any of the officers appointed to open and purify their cargoes (Minutes of Evidence, 1819, p. 101).

As examples of the evidence given before this Committee, we may cite the following (p. 15): Dr. Thomas Foster "could never find any evidence of a plague case existing anywhere here, in England." Dr. James Johnson "has never known or heard of a plague case on board ships arriving at lazarettos in Great Britain." (p. 19.) Dr. William Gladstone "has never heard of a plague case having arrived at, or been seen in, any lazaretto in Great Britain." (p. 24.) John Green, Esq., "has never known any person who handled the goods in quarantine in England to be infected." (p. 39.) Dr. John M'Leod "has never seen or heard of anything like the plague in Great Britain since 1665." (p. 42.) Sir Arthur Brooke Falkner, M.D., "has never heard of plague as imported into England since 1665." (p. 52.) Sir James M'Gregor, M.D., "has never heard of any expurgators of goods in this country being afflicted with plague." (p. 61.) Dr. Charles Dalston Nevinson, "There is not to his knowledge any verified case of plague in England since 1665." (p. 72.) Dr. Algernon Frampton "has no knowledge of any disease under the denomination of plague in England since the year 1665." (p. 74.) Dr. John Mitchell "has never heard of plague in England since 1665." Being asked, "If infection had arrived at any of the quarantine establishments, is it probable that some of the importers of goods must have taken the plague?" he replies, "If it was infectious, like the small-pox, they must. Does not suppose the plague of 1665 to have been imported." Being asked, "Do you consider the fact of the plague not having appeared at the quarantine establishments for a hundred years to be any sufficient reason to infer from thence that the plague was not imported?" he replies, "There is the strongest reason to believe, that, if in the course of one hundred years it has not been imported, it is incapable of being imported." (pp. 93, 94.)

Again, before the Committee of 1824, the following witnesses, among others, give evidence to the same effect. Mr. Saunders, superintendent of quarantine in Standgate Creek:—"Every illness, however slight, is reported and brought under his notice. Does not recollect any cases of persons taken ill, or actually ill when they arrived. Does not recollect an instance in which the expurgators, who are the persons who examine the goods, have ever been taken ill in consequence of such examination. During the fourteen years that he has been superintendent does not recollect an instance."

Mr. Nicholls "has never heard of a single case of the appearance of plague since the establishment has been formed, neither on board ship nor on board the lazaretto, nor among the people that are employed in unpacking and repacking the goods."—(p. 20.)

Mr. Maude "has never heard of any case of infection arising in the lazaretto in the airing of goods. Never knew of any expurgators, who put their arms up them, being affected."—(p. 36.)

Sir Gilbert Blane—"No instance of infection has ever occurred in England since 1665."—(p. 48.) Being asked, in reference to a former question, "If no instance has occurred of any such expurgator being infected, there can be but little risk of communication of infection, and therefore little benefit in that mode of airing, which frequently materially damages the goods?" he replies, "I should conceive very little benefit."—(p. 34.)

Dr. (now Sir William) Pym "knows of no vessel in which the plague has occurred coming to England."—(p. 67.) Being asked, "Should you not infer that, if in the course of a century and a half no instance of the plague being imported has occurred, it is not likely that it can be imported?" he replies, "It seems to be very improbable certainly from that circumstance."—(p. 69.)

Ralph Green, Esq., Inspector of Hospitals, "is not aware that he has ever heard of any instance in which the expurgators, or any of the persons employed in packing or removing the goods in this country, have been affected."—(p. 92.)

Mr. W. Matthias, superintendent of quarantine at Milford Haven, "has never known any instance of sickness or disease appearing among the persons concerned in unpacking or packing."—(p. 99.) Never had any indisposition occur at Milford. Finds men perfectly willing to undertake the office of expurgators. Has never found any unwillingness to perform the duty."—(p. 101.)

Dr. Newberry, medical superintendent of quarantine at

Standgate Creek, "has never known any instance of the appearance or symptoms of the disease called plague among those who have been employed in unpacking a vessel."—(p. 102.)

These statements are in harmony with the testimony given by the officers of foreign quarantine establishments, of which the following evidence, collected by Arthur T. Holroyd, Esq., may be cited as an example:—

"*Giovanni Garcin.*—How long have you been employed in the Lazzaret at Malta?—Twenty-nine years.

"In what capacity are you now employed?—First clerk to the Lazzaret.

"Is it customary for the guardians to ask persons coming from infected places, if they have any sealed letters; and if they have, to take them and carry them to be fumigated?—It is the custom.

"During the twenty-nine years that you have been attached to the Lazzaret, have you ever known an instance of any person employed in fumigating the letters from infected places to have been attacked with plague?—Never; but the letters from infected places are always fumigated first, then opened with scissors, and fumigated a second time previous to being handled. This is done only with letters which arrive from places where plague actually exists.

"Have you ever known an instance of a guardian employed in handling the baggage or wearing apparel of passengers, or of the crew of a vessel, to have been attacked with the plague?—Never.

"Have you ever known an instance of the persons employed at the Lazzaret, in exposing cotton, wool, feathers, flax, rags, sails, or other susceptible articles from infected places, to have been attacked with the plague whilst so employed, excepting vessels having the plague on board?—Never.

"Have you ever known an instance of a laundress employed to wash the linen of persons in quarantine, to have been attacked with the plague?—Never.

"And they handle the dirty linen without any precaution previous to immersing it in water?—Without any precaution.

" Have you ever known an instance of plague occurring amongst persons placed in quarantine in the Lazzaret, of course excepting those removed from vessels where the plague was raging at the time?—Never.

" *La Valetta, Malta, September* 1838."

The following table, furnished by Captain Bonavia, Superintendant of the Lazzaret at Malta, shows the number of persons annually detained in quarantine at that place during a period of seven years:—

Years.	Passengers.	Troops.	Pilgrims.
In 1832	1123	1542	—
1833	946	299	—
1834	1160	933	599
1835	1267	—	362
1836	1813	—	906
1837	2494	—	93
1838 to 12th Sept.	1739	—	—

Captain Bonavia being asked—" Of these numbers, have you ever known a case of plague occur when persons have been placed in the Lazzaret, of course excepting those removed from vessels where the plague was raging at the time of their removal?"—he answers—" Never."

Dr. Laidlaw has also stated to us that he has availed himself of every opportunity of making inquiry as to this point among the officers of quarantine stations in all the foreign countries visited by him, and that he has never found even a reputed or suspected case of infection among this class of persons, nor had any one examined by him ever heard of such an instance.

It has been justly observed by Dr. Maclean that, taking for granted the correctness of the received doctrines, and assuming that the degrees of susceptibility of all articles as laid down in the quarantine laws of the kingdom are founded upon ascertained data, it must of course happen that " in cargoes from Turkey generally there will be a great many of the articles enumerated in the first class, as being the most susceptible of imbibing contagion. These cargoes are necessarily composed of the produce or manufacture of various parts of the country, packed and shipped at various periods, some of these periods being pestilential and some not. A ship therefore sailing with a clean bill of health might have her cargo foul, as having been packed and shipped during the prevalence of plague; whilst a ship sailing with a foul bill of health might have her cargo clean, as having been packed and shipped previous to the commencement of pestilence. This would necessarily frequently happen, supposing always the doctrine of pestilential contagion to be true; or rather it would be the most common course of things; for it could not be prevented by any practicable vigilance. Let us suppose cotton to be packed in the interior of Egypt or of Turkey by persons having the plague upon them, and this cotton to be shipped at Alexandria or Smyrna, with clean bills of health, the usual period of forty days from the cessation of the plague, conferring this privilege, having elapsed. It is contended by medical men that plague-virus may remain in cotton for an indefinite period. But there is not any one conversant with the trade of Turkey and of Egypt who can deny that this case very frequently happens; and hence it is plain that cotton would often be shipped from those countries full of contagious virus, if such a thing there were, and furnished too with a clean bill of health."

There is positive evidence that this constantly happens to a vast extent. During the plague of 1835, says Dr. Laidlaw, "which preserved its epidemic character from the beginning of January till the commencement of June, and during which period upwards of 9000 persons in the town of Alexandria (it is computed that 200,000 persons fell victims to the disease in the whole of Egypt within this period of time) alone must have suffered from the disease, vast quantities of cotton-wool were embarked on board British merchant-vessels, and sent to England. The cotton so embarked was taken from the government cotton-stores where the plague raged most fearfully; it was pressed on board the English vessels, so as to render it convenient for stowage, by the crews, assisted by working parties of Arabs who came from the shore and who returned home to sleep; there was nothing like a quarantine observed by any of the

English captains, and the English sailors were constantly at work at the cotton-store, shipping off the bales in their boats. In fact, there was the most perfect communication and contact which any reasonable experimenter could have desired, and no precautions, no fumigations, no airings were adopted: the cotton was stowed away in the holds of the ships, screwed into as small a compass as possible, the hatches closed, and thus it was conveyed to England. In some of the ships the plague broke out among the crews during the time they were loading, but the work of stowing the cotton went on notwithstanding; communication between the infected ships and those which had no sickness on board was unrestricted, and the disease did not spread to any extent among the former, nor was it communicated apparently to the latter. The exportation of cotton-wool from Alexandria during the year 1835 amounted to 98,502 bales, all of which was sent to Europe in the following proportions:—

To England . .	31,709 bales	To Leghorn . . .	424 bales
To Marseilles . .	33,812 ,,	To Holland . . .	150 ,,
To Trieste . . .	32,362 ,,	To Sundry Ports . .	45 ,,

"A bale of Egyptian cotton consists generally of about 200 lbs. weight.

"The English vessels which cleared out from Alexandria, with cotton cargoes on board for England, during the same year, were in number about 25, namely, the

	Date of Clearance.		Date of Clearance.
Hero	Jan. 18	Arion	June 23
Beatrice	Feb. 28	Astrea	June 18
†Pursuit	March 13	Kate	June 26
†Patriot	April 7	Hortensia	July 8
†Rapid	April 7	Lucy	July 3
†Elliotts	April 18	Frederick Young . .	Aug 29
†Delight	April 29	Mars	July 17
†Martha	April 25	Moslem	July 25
Apollo	April 30	Livorno	July 27
Lady Keith . . .	April 30	Cuba	Aug. 31
Celt	May 15	Hopewell	Sept. 7
Portia	May 12	Jane	Oct. 31
†Newham . . .	June 9		

"At the period when these ships sailed the plague was raging most violently in all quarters of the town. The ships' names which are marked thus (†) had the plague on board among their crews.

"Let us now see what are the conclusions to be drawn from the above data. Here we have 25 British ships clearing out from Alexandria during a year of epidemic plague, and carrying into Great Britain no less than 31,000 bales of goods, supposed to be capable of contamination in the highest degree; of these 25 ships, eight actually had the disease among their crews during the time they were loading. All these vessels, when they arrived in England, had to perform a long quarantine, for the supposed purpose of purifying the cotton from the latent fomes it was supposed to contain. If the quarantine officers did their duty, all these bales of cotton should have been ripped open and freely handled, first by the crew, and afterwards by porters and other persons appointed for such duties, in the presence of a quarantine guardian; and if no person were attacked during this expurgation, and after a period of forty days or more, according to circumstances, the ship's company were entitled to pratique."

By order of Council, cap. xxxii., it is regulated that "All bales of cotton shall be opened from one end to the other, and so much taken out as to leave room for handling daily the interior of the bale;" but the evidence given before the Committee of the House of Commons in 1824 shows that this order is not obeyed. If the cotton, imported under the circumstances described by Dr. Laidlaw, were really impregnated, as quarantine assumes, with plague virus, the following statements will show the amount and value of the means which quarantine has provided for the security of the country:—

Mr. Sanders, superintendent of quarantine, is asked—

"Are there any of the first class of goods ever left without the probationary airing?—Yes.

"Is it not as necessary that the whole should be aired as any part?—So it would appear; but in the case we had within these few days, of a ship from Alexandria with a thousand bales of cotton, it would have been impossible to air those within fifteen days upon deck.

"The bales of cotton are cut open?—They are.

"And the cotton is aired upon the deck?—Yes; the cotton is ripped open from one end to the other, and some of the interior removed.

"Is the whole of the interior of the cotton opened to the air?—Not with a clean bill of health."

In Ireland, however, whether the vessel arrives with a clean or a foul bill of health, there appears to be no airing of the cargo whatever. Mr. James M'Neil, superintendent of quarantine at Carlingford, in his evidence before the Committee states—"There is no floating lazaretto, nor any lazaretto on shore at Carlingford. There is no other place to air goods than the deck of the vessel in which they come. In the last three years there have been forty-two vessels. They never do more than hoist the bags upon the deck, as many as they can get at near the hatches. There is no means of examining or airing the cargo with a foul bill of health. Believes the bags have never been opened. The captains have always stated to him that it was impossible to do it. Has never heard of any sickness at Carlingford. There have been arrivals from Smyrna, and he believes with hides and skins from Africa. There is no physician within ten or twelve miles. Vessels with foul bills of health, he understands, have repeatedly arrived at Carlingford. In point of fact, a bale of cotton is not opened at any time. There has sometimes been much cotton and rags."

It is evident, then, that were it possible for plague to be communicated by cotton, this disease must constantly break out in Ireland, where cotton as much impregnated with plague virus as is possible is sent directly amongst the manufacturers without the slightest precaution; nor could the imperfect airing which cargoes undergo at other quarantine stations prevent Manchester from being the continual seat of plague.

After such evidence we submit that it must be a needless interruption to commerce and a wanton waste of property to cause any delay whatever in the immediate landing and disposal of cargoes, whether the vessel has a clean or a foul bill of health, and we apprehend the recent removal of quarantine against Turkey and Egypt by order of the Privy Council shows that in the opinion of the Privy Council any further hesitation on this subject is unreasonable.

But if quarantine be given up with reference to Oriental plague, against what other disease is it reasonable to attempt to maintain it? Not surely against yellow fever; for it is now generally admitted that this peculiar form of fever is incapable of existing, excepting within a certain range of temperature, which range renders it in the highest degree improbable that it can ever prevail in Great Britain.

We have already quoted Dr. Rush's retraction of his opinion as to the contagious nature of this disease. The predominant medical authority quoted in the Report of the Special Committee of the House of Assembly of New York (1846) appears to be in favour of the local origin and the non-contagious character of this disease; while the general tenor of the evidence adduced is highly corroborative of these views. In the account given of the result of one epidemic, for example, they say—"2400 persons died; 389 persons were admitted into the Bellevue Hospital: of this number 205 died; yet the attendants of the hospital, the physicians, nurses and washerwomen, although literally surrounded by pestilence, did not catch the infection. And the boatmen belonging to the Health-Office, who entered the hospital at all times, and were not only employed in bringing the sick from the city and shipping, but in removing them from place to place, enjoyed a uniform state of good health."

The Report, in speaking of the Philadelphian epidemics, observes:—"In 1802 Philadelphia again finds the disease within her boundaries, and this is attributed to a packet which arrived from the Cape. Dr. Rush, however, laboured with great zeal, and brought to the task great learning to prove that the yellow fever was of domestic origin, and that we were to look alone to filthy streets, putrescent matters, and other kindred evils for its true origin in our city."

Dr. Sweetser, quoted in the Report, says,—"Contagionists and anti-contagionists still exist, although the latter seem manifestly to be gaining the advantage in respect to numbers, both among the enlightened physicians of Europe and our own country. My own view of the matter is this—namely, that if yellow fever is contagious at all, it is so but in a very feeble degree; by no means like small-pox, &c. The evidence is, that if the subjects labouring under it are removed to the country, or to any district where the fever does not exist, those exposed to them in such uninfected spots do not receive the disease; this is as a general rule, for there are some exceptions. It generally affects particular streets or districts, and does not extend itself beyond them."

In a Report of a Committee of Physicians of New Orleans, the reporters say—"That they can see no reason why the same local and general causes, under the same circumstances, or very nearly so, should not produce similar results, in the production of malignant fevers in both hemispheres. Where sufficient causes exist to engender disease in one place, it is useless to speculate on the question of its importation from some other place. In reviewing the history of the yellow fever for 150 years past, the Committee had come to the conclusions that it was developed in a similar way in both hemispheres; that it is confined within nearly the same parallels of latitude, forming distinct yellow-fever regions, in addition to the regions of cholera and plague; that in the gradual progress of civilization measures have been adopted, and changes of climate have taken place, which have greatly diminished the yellow-fever region in this hemisphere; and that its northern limit is now twelve degrees south of what it was a hundred years ago in the time of Lind; that this great result has been accomplished not by quarantine laws, but by other judicious police (sanitary) regulations, together with great changes in the local features of countries, and those atmospherical changes over which man has no control."

An international medical commission having been proposed in 1838 for the consideration of the three chief diseases in respect to which quarantine was deemed a security, viz., the plague, the cholera, and the yellow fever, the Austrian Government stated through Prince Metternich, that "in regard to yellow fever, we think that this disease also is too little known in Europe for it to be made a subject of general deliberation; it should therefore be left for the governments whose states are apprehensive of its invasion to make a separate arrangement on that point."

Sir William Pym, who is strongly prepossessed with the belief in the virulence of the contagion of yellow fever, nevertheless admits that the risk of its spreading is very small wherever there is a free ventilation of fresh air. Thus in p. 66 of a recently published work, he expressly says, "that in an open airy situation persons may approach a patient in this disease, perhaps even to contact, with very little or no danger:" and, again, when speaking of one of the Gibraltar epidemics, he says, "upon the Neutral Ground (to which several thousands of the inhabitants of the Rock had retired) there is a constant and strong breeze or current of air sufficient to destroy the contagion of any disease, and in this way the contagion not spreading is to be accounted for this year (1810), although in 1804, when the sick were crowded into temporary barracks or sheds upon the same spot, all the hospital attendants were attacked by it."

In describing the measures which he took to check the progress of fever on another occasion, he says,—"The first step I had recourse to was to propose a change of quarters for the regiment, which was immediately ordered by General White, who then commanded. The men were encamped upon an airy elevated spot of ground, Point Negro, close to the sea, about two miles and a half distant from the town, where they experienced an almost instantaneous change for the better; after some days, disease disappeared in the camp, where the regiment continued in the highest health for three weeks."

According to the practice of Sir William Pym, therefore, the true precaution against yellow fever is not the confinement of the sick in lazarets or in quarantine vessels, but their dispersion in open airy situations.

We submit that such considerations as we have here presented preponderate in determining the question as to any system of prevention against the introduction and spread of epidemic diseases which it may be deemed reasonable to continue or adopt; that they assign the reason of the great practical truth to which we have so often adverted, that the only real security against epidemic disease is an abundant and constant supply of pure air; that they prove with reference to quarantine that its regulations must be ineffectual, since by all of them this primary and essential principle is overlooked, and that they clearly lead to the conclusion that if, as has been stated, the general result of modern investigation and experience be that confinement in a foul atmosphere can convert common fever into pestilence, and that ventilation and dispersion can dissipate any contagion, the entire basis of quarantine is gone, and the system must be abandoned as useless and even injurious.

But it may be said that a system of precaution which has been in use so many centuries, and which has been relied on as a security by all nations, cannot be abandoned as long as there is any degree of doubt respecting its efficiency. To this it may be answered that experience has fully shown the utter inefficiency of quarantine, and the danger that has followed from the substitution by this system of false for real securities.

If it be said that the abolition of quarantine will occasion inconvenience, it may be answered that such inconvenience, whatever may be the amount of it, will only be temporary; and that against this contingent inconvenience must be placed on the other hand the actual constant inconvenience, danger, and positive loss arising from its continuance.

With reference to the personal inconvenience and risk caused by quarantine, we may state that instances of great suffering and the probable loss of life, resulting from the manner in which quarantine regulations have been recently enforced in this country, have been brought under our own observation, and we have adverted to them in the representation which we deemed it our duty to make on this subject to the Lords of the Privy Council. (Appendix 1, pp. 132, 137.) The facts we have now stated relative to the narrowness of the sphere of infection exemplify the inutility and cruelty of placing vessels in quarantine six miles from shore, in a situation in which it is impossible that they can be reached at all during the night, or in stormy weather, and in which medical assistance, however urgently needed, cannot be obtained under the most favourable circumstances in less than six or eight hours.

The inhumanity of this proceeding is placed in a still stronger light, when it is considered that the attacks of these diseases occur for the most part during the night. On referring to the experience of cholera in this country, it appears that the great majority of the seizures were between twelve at midnight and six in the morning. In Hamburg the attacks were so generally in the night, that when the epidemic was at its height, many persons were afraid to go to bed at all; and it is remarkable that the same observation has been made with respect to plague when it prevails as an epidemic. Dr. Laidlaw states, that in his own experience at Alexandria, during the prevalence of the plague in that city in 1835, eight-tenths of those who were attacked were seized during the night-time—generally early in the morning. "I do not recollect," he says, "to have been called to a fresh case of plague till between five and six in the morning."

In our communication to the Privy Council (Appendix 1, p. 138), we took occasion to direct attention not only to the inaccessibility of some of the situations chosen for quarantine stations in England, but also to their unhealthiness. Sir William Burnett, in describing the quarantine station at Standgate Creek, says, "It is one of the most bleak and sickly places on the whole coast of Kent;" and the general superintendent of quarantine, Sir William Pym, assigns as the reason why he recommended the removal of the unhappy crew of the *Eclair* from the quarantine station of Motherbank, was that the vessel would be inaccessible in stormy weather. "Taking into consideration," he says, "the very sickly state of the crew and the difficulty of communicating with the vessel at the Motherbank in the event of boisterous weather, to be looked for at this season (October 1st), I thought it advisable to order her round to the Foul Bill Quarantine Station at Standgate Creek;" that is, to the place described by Sir William Burnett as "the most bleak and sickly on the whole coast of Kent." In consequence of this unfortunate recommendation, the sick, instead of being immediately landed and at once conveyed to the well-ventilated wards of Haslar Hospital, as was proposed by Sir John Richardson, the physician of the hospital, were confined to the foul atmosphere of the vessel between five and six days after her arrival at Portsmouth, during which period several of the crew who had hitherto escaped fell sick and died. The melancholy experience of the *Eclair* affords an example of the result of quarantine regulations; an example which ought not to be lost to the legislature and the country.

All who have had experience of Standgate Creek concur in the opinion expressed of it by Sir William Burnett. Among numerous witnesses examined by Mr. Bowie, Captain M'Laren says, "It is enough to give a fellow the plague to look at it." Captain White, "The first time I saw it I thought it the most awful desolate place I had ever seen, and wondered how the gentlemen acquainted with these things could have appointed such a place." Captain William George Gibbons, "It is a most unfit place, and much more likely to cause disease than prevent it." Captain Conbrough, "It is one of the worst places I ever saw; the most likely to produce sickness, and a disgrace to the port of London."

If the public health were really secured by the enforcement of quarantine regulations, we are of opinion that no commercial advantages that could result from their abrogation ought to have any weight; but if these regulations are useless, and still more if they are positively injurious, it is proper that attention should be directed to the fiscal inconveniences they occasion.

The British public and civilised nations are now aware of the value of speed in the transit of goods and persons by sea as well as by land. By the amount of those commonly recognised advantages may be estimated the disadvantages and losses to which the consumers generally, and merchants frequently, are subjected by the interruptions of the commerce of this country and that of Europe by quarantine. It frequently occurs in this country that the expenses of the twenty or thirty days' detention of a cargo are equivalent to the expense of the whole voyage home. It is estimated that the expense on cotton goods is 15 per cent.; to the losses from increased freightage, and insurance charges from delay, are to be added the losses from increased risks in perishable goods, such as fruits, and the absolute seclusion of such produce as will not bear the risks. As such losses are supposed to be ultimately paid by the consumers, the persons immediately paying them do not take that interest in the removal of the obstructions in question which might be expected, and which will only be accomplished by Governments or officers acting in behalf of the public. The goods and produce of this country are subjected to the like delays and expenses in other countries where regulations similar to those which we have endeavoured to show it is expedient to abolish are still allowed to prevail, notwithstanding the universal experience that, as we have seen, not an instance of plague has ever been known to occur to the officers of their own lazarettos from the opening of goods.

If it be said, that, admitting the correctness of the general views now stated, the expediency of the abolition of quarantine must depend on the light in which foreign nations will regard that abolition, it may be answered, that foreign nations can have no reasonable objection to the abolition of quarantine if a better, that is, a really efficient system of prevention be substituted for it; which is the object we have in view.

But there is reason to believe that some of the most important European nations are already prepared materially to change, if not entirely to abolish, the system of quarantine. The scientific men of France have taken the lead in showing the fallacy of the arguments on which the doctrine of contagion being the principal agent in the diffusion of epidemic diseases is commonly founded, and the utter failure of sanitary cordons in arresting the progress of these maladies. In accordance with these views the French Commissioners have proposed important modifications of their present quarantine system, though they do not fully carry out the medical conclusions established by the Report of the Academy into practical administrative regulations. See Dr. Gavin Milroy, p. 60. France has also abolished quarantine against Algiers since it fell into her possession.

Holland has never had any regular system of quarantine.

From a Memorial recently addressed to the Austrian

Government by Professor Sigmund, of Vienna, it appears that both the Austrian people and government are prepared for fundamental changes in the existing system of quarantine. Professor Sigmund, who for many years past has had his attention specially directed to the state of the quarantine laws and regulations in the different ports of the Austrian dominions, seems to have had many opportunities of making himself intimately acquainted with their details. He was present in Cronstadt in 1828, during the last appearance of the plague in that city; and he also personally examined on the spot the malignant pestilential fever that prevailed in Wallachia from 1827 to 1829, and which many considered to be the plague. Besides having visited almost all the quarantine stations in his own country, he has inspected many both in Italy and France.

Among other minor changes, the following are the principal recommendations which he offers to the Austrian Government:—

1. The abrogation of all restrictions upon the transit of merchandise and rough goods; the entire exemption from disease on the part of the expurgators of such goods being a sufficient proof of the complete innocuousness of the articles in question.

2. A great shortening of the detention of passengers under all circumstances.

3. A fusion or amalgamation of the different quarantine regulations in different parts of the country, so that a uniform system may prevail everywhere.

He states that many of the existing quarantine regulations are utterly inconsistent with our present knowledge of the plague; and with respect to others he represents their very stringency as leading to their neglect, and even to their total omission. For example, he says that in some quarantine stations on the Austrian frontier there is often such a scanty supply of water, that it is utterly insufficient for the required ablutions of goods, clothes, cattle, &c., so that a vast deal passes without any purification whatever, while in others the airings of the baggage, &c., of travellers is generally left to the parties themselves to do as they think fit. There is thus a constant system of evasion and smuggling going on, and it is utterly impossible to prevent it. He dwells with marked emphasis upon the great importance to Austria in a commercial and economic point of view that all unnecessary quarantine restrictions should be relaxed as far as prudence will admit; and he represents this as the more necessary in the present day, when her communications with the East have become so much increased along the Danube by steam navigation, and more recently still by the formation of railroads. The numbers of persons continually passing and repassing, and also the transit of all sorts of goods, he states to be a hundred-fold greater than it was twenty years ago; and the increase, he says, would be still greater were it not for the vexatious and expensive obstacles which the quarantine establishments create.

In answer to the representation sometimes made, that the exemption of Austria from any outbreak of the plague for many years past may be due to her quarantine system, he observes, that when it is known how imperfectly the appointed and ordained regulations are carried out, and how continually they are evaded, it may be fairly presumed that they have but little to do with the exemption; that it is utterly impossible to maintain anything like a sanitary cordon along the immense extent of the Austrian frontier; and that, consequently, the inevitable result must be, that if impediments exist at certain points of the line, there will constantly be a system of illicit transit at others. What, he asks, would be the result in the event of the appearance of any case or cases of plague, if the Government were so imprudent as to attempt to carry out in full force the quarantine rules and regulations as they at present stand? Probably, he answers, the ruin of the trade with the East, which of late years has so much increased, and which, if once seriously interrupted, would probably find its way into Europe through other channels, especially in these days of commercial rivalry.

He further alludes to the relaxations which Austria has introduced into her quarantines by sea, and inquires why a similar step should not be taken with respect to those by land. He points to what England and France have already done, and expresses his regret that his own country had not led the way in this good work. He points to the absurdity of establishing such costly precautions against the plague (which he concurs with other authorities in confidently stating to be only one form or variety of typhus), and paying little or no attention to any means to keep out the far more common and destructive diseases of small-pox, scarlatina, measles, &c. He very forcibly dwells on the urgent importance of internal sanitary measures among the mass of the people in diminishing the extent and fatality of these and other epidemic diseases. "The well-known numerous enemies to the health of the community," he says, "which we nourish in our bosoms, are much worse than that pestilence which we seek to keep from our land by means for the most part vain and absurd. It is high time," he continues, "that a general revision of the entire quarantine system should take place, in order that what is senseless and unjust may be abolished, and that the whole may be placed on a more sure and rational basis."

From some of his statements we are led to believe that the public mind in Austria is generally fully alive to the importance of the subject, and prepared for an immediate and fundamental change in their quarantine system.

The views of France may be gathered from the general conclusions arrived at in the Report already adverted to of the Academy of Medicine of Paris.

"A severe and attentive examination," say the Commissioners, "of the facts of which medical science is possessed establishes, on one hand, that in the focus of the epidemic the immediate contact of infected persons by thousands proved to have no ill effect on those that were exposed to it in the open air or in well-ventilated places; on the other hand, that the possibility of the disease being transmitted by the simple contact of persons infected is not demonstrated by any rigorous observation.

"A great number of facts prove that clothes having belonged to infected persons did not communicate the plague to those who made use of them without any previous purification in a country actually or recently submitted to a pestilential constitution. The facts which seem to have offered a contrary solution can only become of any value by being confirmed by new observations made without the epidemic focus, far from those of miasmatic infection and from countries where the pest is endemic.

"Nothing proves that the plague is transmissible without the epidemic focus, by the immediate contact of those who are infected.

"It is in no manner certain that goods can convey the plague out of the epidemic focus.

"The classification existing in our lazarettos for objects liable and not liable is not grounded on any facts or experiments worthy of credit.

"These (the existing quarantine regulations, particularly of Marseilles) having been dictated under the influence of exaggerated fear, and a total ignorance of the limits of the danger, are stamped in several points with a character of barbarism, which, as well as the remainder of them, demand an early reform."

Similar views have gained ground in America. A distinguished American author writes thus :—"The application of quarantine-laws ought not to be regulated in reference to the places from which vessels arive, but by the state in which they arrive. There is no cause for detaining, on account of the yellow-fever, a ship which is itself in a pure and healthful state, from whatever port she may have sailed, nor however sickly that port may have been. On the other hand, no ship that is foul and offensive, or that has a cargo in a putrid state, although the place from which she sailed or the persons on board be ever so free from sickness, ought to be permitted to approach the town (Boston) until she has been thoroughly cleansed. There ought to be a rigorous system of inspection during the summer and autumn into the state of every ship which has a cargo of a perishable nature, while she is discharging. In this manner the danger, when it exists, will be detected before it can have extended to any considerable number of persons, and will be promptly removed."

The spread of information on this subject among foreign countries is greater than is commonly supposed, and it is evident that the difficulties on the part of Great Britain in making the required change in its quarantine system would, in practice, be found less than is anticipated.

The influence of France and Austria, in concurrence with Great Britain and America, in the adoption of a course, with reference to quarantine, in accordance with the present state of knowledge, would probably at no distant period induce the governments of other countries to emancipate themselves from the opinions of quarantine officers, and to adopt similar reasonable views; and it appears to be a high moral duty to set to less instructed governments and populations the example of abandoning trust in false securities, and of substituting real and effectual safeguards. Benighted countries, indeed, which still adhere to the same views of disease and the same remedies as were prevalent two centuries ago, must be expected for a time to act in conformity with their state of knowledge; but the more advanced nations will scarcely be prevented, by such opinions, from pursuing a course demanded alike by the common interests of all.

In the case of the *Eclair* the general superintendent of quarantine objected to the immediate landing of the sick from that vessel upon her arrival at Portsmouth, upon the ground of apprehended retaliation from other countries. "I beg leave to state," he writes, "that the disease from which the crew of the *Eclair* have suffered is one against which Europe generally has established a quarantine; and being aware of the disastrous consequences to the mercantile interests of this country, in the event of the *Eclair* being admitted to pratique, viz., the establishment of a rigid quarantine by most of the European powers, but certainly by the Italian States, upon all vessels arriving in their ports from the United Kingdom, for this reason alone, and without entering into a discussion relative to the security of the public health, I object most decidedly against the release of the *Eclair*, as well as against the landing of the crew."

But was the precaution of Sir William Pym successful in preventing the evil he so much dreaded, viz., the imposition of quarantine upon this country by foreign nations? Scarcely three weeks after the arrival of the *Eclair* at Portsmouth, the British Consul at Naples writes thus:—"The Board of Health here has, after full deliberation on the unfortunate case of H. M. S. *Eclair*, decided this day that vessels arriving at Naples from any part of the coast of England between Portland and Dover will be refused admittance in the ports of this kingdom; and that vessels from all other parts of England will on arrival be subjected to a quarantine of twenty-one days." It appears too that Malta and Gibraltar were put under partial quarantine at the same time in consequence of their communication with England. These most absurd regulations actually continued in force to the 14th of November; that is upwards of six weeks after the arrival of the *Eclair* in England, to the serious detriment alike of their own and of our commerce.

As a further illustration of the inutility of quarantine regulations as at present enforced, we may advert to the difficulty, if not the impossibility, of obtaining information as to the prevalence of disease in really affected ports in time to prevent vessels from sailing, and which must, therefore, on the assumption of quarantine, be in the most imminent danger of carrying the infection. We have reason to know, from the applications made to us from time to time on the part of foreign consuls for information as to the state and locality of cholera during its recent outbreak, that they are without the knowledge which is necessary for their guidance in issuing or withholding clean bills of health. We have given them such information as we had, and we believe that our information, from our special attention to the subject, is the best that exists. But it has happened that no positive information has been communicated to us of the outbreak of cholera in a place for several days, and even weeks, after the attack. If, therefore, we had to give clean bills of health, we might, as other authorities unquestionably have done, authorize the issue of clean bills of health for places where the disease was positively existing, and had been so for some time. An epidemic breaks out on the same day at widely distant points, marking the extent of the epidemic influence; but the people themselves may not be aware of the existence of well-developed cases at some distance from them. The difficulty, therefore, of obtaining information in sufficient time to prevent vessels from sailing from infected places with clean bills of health is insuperable.

The principal ground on which we have objected to the continuance of quarantine is that the fundamental principle on which it is based is fallacious, and that the only means of preventing the origin and spread of epidemic disease is the adoption of sanitary measures. Substitution of sanitary measures for quarantine restrictions would in our opinion render the importation of any disease from one country into another in the highest degree improbable, and we therefore accompany the proposal to abolish quarantine with the recommendation to substitute for it a plan of sanitary regulation.

There has been and continues to be a popular impression of the importation or the contagiousness of disease, created by the frequent occurrence of epidemic diseases amongst itinerant classes of the population. Seeing the occurrence of such diseases amongst those who travel, it is an easy and apparently a natural inference that the diseases are carried by them. Thus, the low tramps' lodging-houses in our towns were in the Sanitary Report shown to be throughout the country the worst of fever-nests in each place; but they were also shown at the same time to be the places where there was the most overcrowding and the greatest filth. With a stationary population, with the same overcrowding and filth, it may be confidently pronounced that the disease would be worse. When by bad weather the tramps are detained and kept stationary, it is worse. The tramping about from town to town and in the open air—the movement which to superficial observation imports the disease—in reality mitigates it. From what we have already said, it is consistent with this general statement that tramps infected with fever in one place may carry it with them and spread infection in another place amongst classes of persons predisposed by the like habits and conditions, as was exemplified in the spreading of the Pali plague. Of late times the poor Irish emigrants are said to have imported fever into this country; they are represented, for example, to have imported fever into Liverpool; but the description of the places where the fever burst out, and the overcrowding in them, displayed fever-nests sufficient to have produced fatal results on the most robust of the stationary populations. "In one small cellar with no window," a gentleman, who ministered to the wants of the poor people who had crept for shelter into damp uninhabited houses, and who, it was stated, fell a victim to the contagious nature of the fever, found "eighteen persons in fever, lying on wet dirty straw. In one house he counted eighty-one, in another sixty-one, in every stage of fever, on straw in the corners." It would be surprising if the poor Irish had not imported fever into the lower districts of towns, when, as in Glasgow, they have added 10,000 annually to the already overcrowded and wretched population of that city; just as the miserable refugees from the infected villages of Ragpootana carried the pestilence into the close, filthy, and already overcrowded huts of the neighbouring villages. But the conditions in which the Irish emigrants have arrived, and have been crowded together in the towns as well as on shipboard, are just the conditions in which fevers arise amidst stationary populations; and, we may confidently state, would have been worse had the particular class of migrants been stationary.

The like delusion as to the *importation* of disease is created by the appearance of fever amongst the migrants at sea. It is important that the universal effects of overcrowding, filth, and atmospheric impurity should be known and discriminated in all cases. It will be seen that they produce their effects at sea as well as elsewhere. It appears to be most important also to display the facts as to the common existence of the conditions of fever in ships themselves as at present regulated; and that, if properly regulated, instead of being fever nests or "the means of importation" of the disease, a voyage in the open sea would become a sure means of arresting any such disease. It will be shown that epidemic disease is often more severe in ships when stationary in port than when sailing, and that with them the passage in fair weather when overcrowding is avoided is a means of mitigation.

We proceed to submit the grounds on which we consider that the sanitary regulation of the ships themselves—a measure of the utmost importance to the seafaring classes of the community—would accomplish far more than could be hoped for or pretended to be accomplished by any known system of quarantine, and would have, moreover, a beneficial effect upon popular opinion by removing the fallacious appearances which favour the belief in imported disease, while they divert attention from the true causes of disease, the removable and preventible causes that exist on the spot.

The basis of sanitary legislation is the evidence that has been accumulated in relation to the whole of the epidemic, endemic, and contagious diseases, and the latest opinions of medical authorities with reference to them. It having been shown by indubitable evidence that the prevalence and mortality of typhus, scarlatina, cholera, and every other epidemic disease, are uniformly in proportion to the low sanitary condition of the population, the Legislature has decided on attempting to check the prevalence of these diseases by laying the foundation of sanitary improvement. It appears to us that the measures adopted by the Legislature with this view should be consistently carried out and applied to the dwellings of all classes of the population whether on land or at sea. In the larger vessels in which well-directed care has been exercised, the general ill-health has been reduced below the average ill-health of populations of the like ages on shore; but the evidence which has been brought before us from witnesses at the ports, medical men well acquainted from long practice in the mercantile marine, it appears that the *general* condition of merchant-vessels, and of the forecastle in which common seamen are, for the most part, lodged, renders them in effect cellar-dwellings, just as dark, foul, and unventilated, as the filthy, unaired, and dismal cellars on shore with which the Legislature has endeavoured to deal. It appears also that typhus and other epidemic diseases do break out at sea in these movable cellars, just as they do in the cellars of the dirtiest courts on shore; and were it not that seamen work in a purer external atmosphere, that they are below decks comparatively for short intervals only, and that in general they are men at the most robust periods of life, it is probable that epidemic disease would be still more frequent among them; an inference supported by the fact that whenever passengers, emigrants, and others are, owing to stormy weather, much confined to the berths below, some form of malignant disease is almost sure to break out.

There do not appear to be any existing means of ascertaining the absolute mortality of seamen. We have caused various registers to be searched, but they are all too defective on essential points to afford the results desired.

The Registry maintained under 7 and 8 Vict. cap. 112, commonly called the Merchant Seamen's Act, establishes a record of all seamen who die while serving on board merchant ships or in hospitals in foreign ports; their age, capacity, and other particulars; and the machinery of the office of this Registry is so arranged as to secure that such returns shall be rendered at the termination of each voyage before the vessel is entitled to clearance.

But although the fact of the death is reported in this registration, there is no provision in the Merchant Seamen's Act that requires the cause of death to be specified; the fact being expressed by the words "died" or "drowned," entered under the headed columns of Schedule C or D of that Act, as the case may be.

The application of the general mortuary registration of the country to merchant seamen, which includes a notice of the cause of death, as contained in the 28th clause of the Act for the Registration of Births, Marriages, and Deaths in England and Wales (5 and 6 Wm. IV. cap. 86), "requiring the registry of persons dying at sea, is inadequate for the accomplishment of its object. It merely enacts that if any death occur at sea on board of a British vessel, the captain shall make a minute of the several particulars hereinbefore required to be inserted in the Register touching such death, so far as the same may be known, and shall on the arrival of the vessel in any port of the United Kingdom, or by any other sooner opportunity, send a certificate of the said minute through the Post-Office to the Registrar-General, who shall file the same, and enter a copy thereof in the Marine Register Book, and keep the same with the other registers, according to the provisions of this Act." But no penalty is attached to the neglect of this provision, nor is the Registrar-General empowered to require a registry of the ship's crew when the vessel leaves the port, nor an account of the missing individuals on her return, without cognizance of which his registration of names and deaths is not sufficiently complete to ascertain the mortality in a satisfactory manner.

Moreover it is evident that the law is but very partially complied with, for want of effectual means of enforcing it; for while the average of reported deaths under the Merchant Seamen's Act amounts to 3000 annually, (affording a high mortality compared with that of the Royal Navy, though from various causes even this registration cannot be considered as complete,) the total number of cases reported to the Registrar-General of Births, Deaths, and Marriages during the eleven years that this Act has been in force, amounts to only 783. The cause of death in each of these latter cases is however with few exceptions assigned.

In future legislation on this head, it might be provided, and we think it very desirable that it should be provided, that the cause of death shall be set forth in the lists required under the Merchant Seamen's Act, the deposit of these lists being already insured ; and that the particulars required derived from these lists shall be transmitted weekly or monthly in a particular form by the Registrar of Seamen to the Registrar-General. This will secure the object in view, and avoid the imposition of any additional obligation or trouble whatever on masters of vessels. In the meantime some arrangement might be effected between these officers in furtherance of the object, by the Registrar of Seamen giving intimation to the Registrar-General of the reported deaths as they appear, and thus enable him to call on the masters of the vessels to comply with the law as to the specification of the cause of death.

In the present rate of the registrations the number of facts available for our purpose is very limited, but we must take the best information that is to be obtained, which appears to be that given by the Marine Register. Though the numbers here specified are small, the registry is trustworthy as far as it goes; the return is made by the captains of vessels; their minute is entered with great care in the Marine Register; the registration includes the deaths, not of one year only, but of eleven years; and although there is a considerable difference in the mortality of some of these years, yet the mean average for the whole series exhibits the same general character.

Taking then this registration, imperfect as it is, as the most authentic record that exists, and omitting from it all deaths the causes of which are not specified, as well as the casualties from external violence, the following table will show the proportionate rate of mortality to the total number of deaths in each year from 1838 to 1848, both inclusive, amongst seamen actually at sea, in nine classes of diseases, together with the number from age and from sudden death:—

TABLE showing the proportionate Rate per Cent. of Mortality to the Total Number of Deaths in each Year, from 1838 to 1848 (both inclusive), and the Mean Rate per Cent. for the 11 Years.

CLASSES OF DISEASE.	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	Mean rate per cent. for 11 years.
Zymotic diseases	39·2	50·0	54·5	68·8	73·9	43·8	51·9	48·3	66·7	60·0	36·4	55·9
Diseases of uncertain seat	4·4	5·3	6·1	..	..	12·5	..	..	3·0	3·4	13·6	3·8
Tubercular diseases	4·3	13·2	12·1	..	..	12·5	7·4	10·3	15·2	3·3	9·1	8·8
Diseases of the Nervous System	17·4	2·6	12·1	15·6	13·0	12·5	14·8	6·9	4·5	10·0	13·7	10·0
,, Organs of Circulation	4·3	..	..	..	..	..	11·1	6·9	..	..	..	1·8
,, Respiratory Organs	8·7	10·6	15·2	6·3	8.7	12·5	7·4	6·9	1·5	3·3	13·6	7·7
,, Digestive Organs	21·7	13·1	..	3·1	4·4	..	3·7	6·9	6·1	13·3	13·6	7·6
,, Urinary Organs	..	..	..	..	..	..	..	..	..	3·4	..	0·3
,, Organs of Locomotion	..	..	..	..	..	..	..	..	..	..	..	..
Age	..	2·6	..	..	..	..	..	..	..	..	..	0·6
Sudden death	..	2·6	..	6·2	..	6·2	3·7	13·8	3·0	3·3	..	3·5
All causes	100	100	100	100	100	100	100	100	100	100	100	100

It may be observed that the diseases here termed zymotic are synonymous with the class of epidemic, endemic, and contagious diseases, and they are called zymotic or *fermenting*, from the notion that one disease of this nature acts as leaven thrown into a mass prepared for, that is, having present the conditions for taking on, the fermentive action. The existence of diseases of this class indicates the presence of certain impure conditions of the atmosphere, just as the barometer indicates the presence of certain natural conditions of it.

According then to the preceding table the proportion of deaths from zymotic diseases, compared with the deaths from other causes, was, in the year in which it was the lowest (1848), 36·4 per cent.; in the year in which it was the highest (1842) it was 73·9 per cent.; and the mean rate for the eleven years is 55·9 per cent.

It may naturally be supposed that the large excess of mortality from zymotic diseases here indicated is in part owing to exposure to particularly unhealthy stations, as those of the West Coast of Africa and the West Indies. A large proportion of our traders go to warm climates where fevers prevail; and seamen, who do not make nice distinctions, may have returned, under the general term fever or typhus, cases which ought properly to have been classed under yellow fever or remittent fever. From both these causes the proportion of deaths from fever given in the preceding table may probably be in excess; but after due allowance is made for deductions from such considerations, the general result appears to indicate an amount of mortality from preventible causes which few will be prepared to expect.

Taking the returns as they are, yellow fever, remittent fever, dysentery, diarrhœa, appear to have less influence in raising the mortality than might have been anticipated.

According to the following Table it appears that while the deaths from yellow fever were to the deaths from the whole class of zymotic diseases in the proportion of 11·1 per cent., and to the total deaths from all causes only in the proportion of 6·2 per cent., the deaths from typhus, compared with the deaths from the whole number of zymotic diseases, were in the proportion of 43·7 per cent.; and, compared with the deaths from all causes, in the proportion of 24·4 per cent. The proportion of deaths from cholera, dysentery, and diarrhœa, was but little above that from yellow fever.

TABLE showing the Proportion per Cent. of Deaths from each Zymotic Disease to the Total Deaths, and the Proportion which each Zymotic Disease bears to the Total Deaths from that Class.

CAUSES OF DEATH.	Proportion per Cent. to the Total Deaths.	Proportion per Cent. to the Total Deaths from the Zymotic Class.
Small Pox	0·6	1·0
Measles	0·3	0·5
Scarlatina	0·0	0·0
Diarrhœa	4·1	7·4
Dysentery	7·4	13·2
Cholera	6·2	11·1
Influenza	0·0	0·0
Purpura (Scurvy)	2·6	4·7
Ague	0·3	0·5
Remittent Fever Yellow Fever	2·6 6·2 } = 8·8	4·7 11·1 } = 15·8
Typhus, or Fever simply	24·4	43·7
Rheumatic Fever	0·0	0·0
Erysipelas	0·0	0·0
Syphilis	1·2	2·1
Total of Zymotic Class	55·9	100

Out of the total number of deaths at all ages from all diseases in the metropolis, the proportion from zymotic diseases is, in males, 26 per cent., and in females 27 per cent. From the preceding table it appears that the mean proportion for eleven years of seamen dying at sea is more than double this amount, being 55·9 per cent. But as few deaths occur among seamen before the age of 15, it is only fair to compare the mortality of seamen with the mortality in the metropolis at the age of 15 and upwards. From the following table it appears that the deaths in the metropolis at the age of 15 and upwards from zymotic diseases are 6·7 per cent.; among sailors at sea in the years 1840 and 1841 they amounted to 61·5 per cent. In the peculiarly unhealthy year 1847, when diseases of the zymotic class produced a mortality almost unprecedented in the metropolis, the proportionate rate was only 13·9 per cent., whilst among seamen at sea it amounted to 60 per cent.

TABLE showing the proportion per cent. in 100 Deaths at 15 years of age and upwards, in 10 classes of Disease, Atrophy, Age, and Sudden Death, in the Metropolis and among Merchant Seamen (at Sea), during the Years 1840 and 1841.

CLASSES OF DISEASE.	Metropolis. 15 and upwards.	Seamen (at Sea). 15 and upwards.
Zymotic Diseases	6·7	61·5
Diseases of uncertain seat	12·0	3·1
Tubercular Diseases	25·4	6·2
Diseases of the Nervous System	10·2	13·8
,, Organs of Circulation	3·8	..
,, Respiratory Organs	14·5	10·8
,, Digestive Organs	6·1	1·5
,, Urinary Organs	1·0	..
,, Organs of Locomotion	1·0	..
,, Integumentary System	0·1	..
Atrophy	0·3	..
Age	16·6	..
Sudden Death	2·3	3·1
All specified causes of Disease	100	100

Comparing the deaths in the metropolis of persons of all ages in the class of artizans from zymotic diseases with the deaths of sailors at sea from those diseases, it appears that the deaths among artizans in the year 1829 are 21·5 per cent., while the deaths among seamen in 11 years are 55·9 per cent.

In the First Report of the Registrar-General (p. 110) it is stated that the concentration of the population in cities doubles the deaths from epidemic, endemic, and contagious diseases; the deaths being in a—

	Cities.	Counties.
Population of	3,553,161	3,500,750
Deaths from epidemic, endemic, and contagious diseases	12,766	6,045
Deaths from all other causes	35,187	23,648

It is shown in the Appendix to that Report that the deaths from diseases of the epidemic class increase more rapidly than deaths from other diseases in unhealthy districts, and that this gives the classification adopted by the Registrar-General "a peculiar property." Whenever the absolute mortality is low, the number of deaths in the epidemic class is less than the number in the pulmonary class (including consumption); and, on the contrary, whenever the deaths in the first class exceed or equal those in the third, it may be affirmed that the absolute mortality is high."—(Appendix to Reg. Gen. 1st Rep., p. 111.)

In the ten unhealthiest districts where, as compared with the ten healthiest in London, the mortality from epidemic, endemic, and contagious diseases is doubled, the absolute mortality is raised from 2·16 to 3·32 per cent.; that is to say, whereas the deaths from zymotic diseases in ten of the healthiest districts of London are, in round numbers, 22 in a thousand, in ten of the unhealthiest districts they are 33 in a thousand.

But while the deaths from zymotic diseases are doubled in a concentrated city population, the zymotic diseases themselves are doubled in unhealthy as compared with healthy districts; and the mortality from one particular zymotic disease, typhus, is increased threefold. Thus taking the mortality by zymotic diseases in the most unhealthy districts as 1 in 100, the relative increase is as follows:—In the most unhealthy districts the mortality is as 1 in 100; in the less unhealthy districts it is as 1 in 145; and in healthy districts it is as 1 in 204; while the fatality of typhus increases in the unhealthy districts 303 per cent.

From a return of one of the Insurance Companies showing the relative proportion of deaths from zymotic diseases among the better classes, it appears that out of 4,095 fatal diseases happening among persons assured by the Equitable Society, 489 are from zymotic diseases—about 12 per cent.: that is, less by one-half than the mortality from this class of diseases in the metropolis generally.

The doubling and even trebling of the mortality from diseases of this class, under unfavourable circumstances, is therefore a general principle; but the relative mortality of seamen from these causes is far greater than is experienced among any other class of the population. Compared with the mortality of the whole metropolis at all ages, taking the female deaths, which are the highest, it is, as has been stated, as 27 to 55·9 (the mean) per cent.; compared with the deaths in the metropolis at similar ages, it is as 6·7 to 55·9 per cent.; compared with the deaths among artizans at all ages, it is as 21·5 to 55·9 per cent.; and compared with the deaths among the higher classes at all ages, it is as 12 to 55·9 per cent.

From an abstract of the returns of the Registrar-General of the causes of death among seamen who have died on land, taking the ports of London, Liverpool, Bristol, and Hull, during the years 1845, 1846, and 1848, it appears that the proportion of deaths from zymotic diseases on shore is very much less than at sea, but that it is still far above that of any class of the population at the same ages on land.

In the port of London, for example, the number of deaths of seamen registered in the metropolis during the above three years was 1201. The following table exhibits the proportion per cent. of each class of disease in juxtaposition with the causes of death of seamen at sea for the same period:—

CLASSES OF DISEASE.	Seamen on Shore.	Seamen at Sea.
	Per Cent.	Per Cent.
Zymotic Diseases	25·3	56·4
Diseases of Uncertain or Variable Seat	6·3	4·3
Tubercular Diseases	17·6	12·8
Diseases of the Nervous System	9·3	6·8
,, Organs of Circulation	7·1	1·7
,, ,, Respiration	17·9	5·1
,, ,, Digestion	6·7	7·7
,, Urinary Organs	3·9	..
,, Organs of Locomotion	1·0	..
Atrophy	0·1	..
Age	3·7	..
Sudden Death	1·1	5·2
All causes	100	100

From this table it appears that the deaths of seamen from zymotic diseases on shore are less by upwards of one-half than at sea; and are even less by 1 per cent. than the deaths of males at all ages in the metropolis.

In the port of Liverpool the registered deaths of seamen from zymotic diseases for the same period is in round numbers 28 per cent.; in the port of Hull it is 19½ per cent.; in the port of Bristol it is only 12 per cent. The exact proportions are as follow:—

Metropolis.	Liverpool.	Bristol.	Hull.	Mean for the four Ports.
25·3	27·8	12·1	19·5	24·9

From the whole of these considerations, then, it appears that the proportionate rate of mortality from diseases of the zymotic class among seamen, particularly when at sea, unequivocally indicates the presence and the steady operation of local causes of preventible disease, the extent and the intensity of which have hitherto been unobserved and unsuspected.

There is the same difficulty in obtaining a knowledge of the absolute mortality of passengers at sea as of that of seamen. The number of deaths of passengers on board ship registered during the eleven years from 1838 to 1848, both inclusive, amounts to 336. The following table shows the proportion per cent. to the total number of deaths from each class of disease,—the cases in which the cause is not specified, as well as those in which it is stated to be from external violence, being excluded from the calculation:—

CLASSES OF DISEASE.	Rate per cent. to the Total Deaths.
Zymotic Diseases	39·3
Diseases of Uncertain Seat	3·2
Tubercular Diseases	21·4
Diseases of the Nervous System	7·5
,, Organs of Circulation	0·7
,, ,, Respiration	6·8
,, ,, Digestion	10·0
,, Urinary Organs	0·0
,, Organs of Generation	0·7
,, ,, Locomotion	0·7
Premature Birth and Debility	6·1
Atrophy	0·7
Age	1·1
Sudden Deaths	1·8
All causes	100·

This table exhibits an amount of danger to passengers on board ship from preventible causes of disease which could not have been anticipated.

The preceding results, startling as they are, are, however, confirmed, as far at least as regards seamen, by the observation and experience of private individuals and public bodies who have taken an active interest in the welfare of this important and comparatively defenceless class of the community. In the year 1839 the Committee of the Seamen's Hospital Society published a table derived from the registers of the Custom-house, showing the average ages of 5000 seamen employed in the merchant service; from which they arrived at the conclusion that the period of active service of sailors is much shorter than that of other labouring classes; a circumstance explicable only upon the assumption that the average duration of life is curtailed by an excess of sickness and mortality. Dr. Budd, one of the physicians of this charity, impressed with a conviction of this excess, states that he endeavoured to ascertain the causes of what he terms "the great mortality of seamen."

In the year 1841 Mr. Busk, the medical officer of the Seamen's Hospital, the Dreadnought, had his attention attracted by the large number of cases of typhus admitted into that hospital; and in the year following the cases were still more numerous. From the following return it appears that in the year 1841 there were admitted into that hospital 147, and in 1842 167 cases of typhus.

RETURN from the SEAMEN'S HOSPITAL SHIP, *Dreadnought*, for 1841 and 1842, showing the proportion of DISEASES in that Hospital of the Zymotic and Pulmonary classes.

DISEASES.	1841.	1842.	Proportion per Cent. of Zymotic and Pulmonary Classes. 1841.	Proportion per Cent. of Zymotic and Pulmonary Classes, 1842.
Small Pox	..	..		
Measles	3	2		
Scarlatina	2	1		
Diarrhœa	22	39		
Dysentery	43	30		
Cholera	1	3		
Influenza	1	..		
Purpura (Scurvy)	54	83		
Ague	29	39		
Remittent Fever	..	..		
Typhus	147	167		
Rheumatic Fever	..	..		
Erysipelas	7	13		
Syphilis	..	..		
Total of Zymotic Class	309	377	56·2	63·0
Pulmonary Class	241	221	43·8	37·0
Total	550	598	100	100

From this return it appears that diseases of the zymotic class, compared with diseases of the other classes, were, in the year 1841, in the proportion of 56·2 per cent., and in 1842 in the proportion of 63 per cent. By far the greater proportion of typhus cases came from collier ships; and indeed few cases of typhus can be expected to be brought to the Dreadnought from ships on long voyages, as that disease runs quickly through its definite stages. This extraordinary amount of typhus among colliers and other coasting vessels, exempt from the fever influence of warm climates, corroborates the conclusion indicated by the record of the Marine Register; and taking the principle laid down by the Registrar General (" that when diseases from the zymotic class exceed those from the pulmonary class, the absolute mortality is high") as established, it follows, that as the excess in this instance is so remarkable, the actual mortality must be very high.

It appears further that a considerable number of typhus cases are every year received into the London Fever Hospital from vessels in the Thames.

Dr. Duncan, Medical Officer of Health of Liverpool, says:—" I am informed by an experienced shipmaster, that in his judgment fevers are the diseases to which seamen are principally subject; and it was only last week that I had occasion in my capacity as Medical Officer of Health to visit a sailor who had been sent ashore with typhus fever, and who himself attributed his illness to the deficient accommodation on board his ship."

Mr. Busk points attention to another disease which has of late years again shown itself with alarming force among seamen; one of the most dreadful diseases to which the human body is subject, and which in former centuries was the scourge of seamen. As the special cause of this disease, namely, the scurvy, has been determined, and as an infallible remedy for the prevention of it is known, and is even matter of familiar knowledge, the occurrence of a single case of this disease on board any ship, in any climate, is fairly attributable to neglect or mismanagement.

From the preceding table it appears that in the year 1841 there were admitted into the Dreadnought 54, and in the year 1842, 83 cases of scurvy; and from information which he received, Mr. Budd estimates that in the port of London alone the seamen affected within the same period was double the above number. If to these are added the cases that occur at other British ports, and those which either prove fatal on the voyage or are treated in the colonies, a startling aggregate, and which at present is little suspected, will be found.

The Committee of the Seamen's Hospital, in their Annual Reports for 1847 and 1848, pointedly advert to the prevalence of this disease. In their Report for last year the Committee thus express themselves:—"The Committee cannot refrain from observing that, while every measure has been devised by this society to protect the health of seamen engaged in long voyages from the destructive scourge of scurvy, that disgrace to our mercantile marine, it is to be regretted that the recent enactment (7 and 8 Vic. c. 112) for that purpose has proved inefficient. Even in ships fitted out in this country the useful and benign provisions of the Act are in many instances shamefully evaded; and the health of seamen, which ought to be an object of paramount importance with every master of a ship, is occasionally treated with careless indifference."

On making inquiry into the circumstances in operation tending to produce the extraordinary predisposition to disease which we have thus described, among a class of men for the most part in the prime of life, and engaged in an occupation known under favourable conditions to be not only compatible with, but conducive to, robust health, we discovered, as we have just stated, in the great majority of merchant-ships, and especially of the smaller description of vessels, a sanitary condition in no respect better than that of cellar-dwellings in the most depressed districts of populous towns.

Having requested our medical inspectors and other medical officers, whose attention had been particularly directed to the subject, to make a personal examination of the actual condition of such merchant-vessels as might happen to be in port at the time, or of such a number of them as might suffice to afford a fair example of their general state, we find the representations made by these officers as the result of their inquiry to be of the same uniform tenor.

Mr. Grainger, with reference to vessels in the port of London, says,—" In many vessels the wretched condition of the place in which the men are lodged is such as to be scarcely credible, unless witnessed; without other light than that which enters by the hatchway, and therefore in darkness when that opening is closed; without any means of properly renewing the air; and frequently with the superadded evil, owing to the washing of the sea and the leakage of the decks, of wet and moisture, the forecastle, which by due care could be kept dry, and by simple and inexpensive means could be supplied with fresh air, is actually more unfavourable to the maintenance of health than many of the worst dwellings on land."

Mr. Bowie, also with reference to vessels in the port of London, states—" After a long acquaintance with the shipping of the port of London, and a special examination of a great number of vessels of all classes in the Thames which I have recently made in order to ascertain their condition as to cleanliness and ventilation, and particularly with a view to note the accommodation provided for the sailors, and the probable effect of the atmosphere of the ship upon their health, I find that the instances are extremely rare in which there is any special provision whatever for ventilating either the berths for the men or the hold for the cargo. These berths are for the most part dirty, close, and unwholesome; in numerous instances they are so to an extreme degree; and I am of opinion that the houses and rooms in the close courts of Whitechapel, which I habitually visit, do not as a rule exceed in the unhealthiness of their condition the forecastle of ships, in which the filth is often as great, the air as close, stifling, and offensive, and altogether as likely to generate fever, and to cause it to spread if it does break out."

Dr. Duncan, Medical Officer of Health for Liverpool, says,—" I have visited a number of vessels of all classes now in the Liverpool Docks, with reference to the accommodation afforded to their crews, and I find that in this respect considerable variety exists, the larger vessels, particularly the Indiamen, being on a better footing than those of smaller size; but in none that I examined was the breathing-space more than half what would be considered on shore as essential to health. In all the smaller vessels, and in the majority of those of every description, the sailors sleep in the forecastle, situate between decks, where the vessel tapers to the bows, and where the height is often not sufficient to enable a man to stand erect. The only opening for light and ventilation is the hatchway by which the sailors descend, and which in stormy weather must frequently be closed. These places might properly be termed floating cellars, although they are in no respect equal to the inhabited cellars of Liverpool. Such cellars on shore, indeed, would be condemned as unfit for habitation under the provisions of our Sanitary Act."

Dr. Sutherland, with reference to vessels in the port of Glasgow, says,—

"The best of the accommodation which is provided for the sailors is disgraceful to the mercantile character of the country, and I cordially concur in the observation of one of the gentlemen who accompanied me on the inspection, that no ship should be allowed to proceed to sea which could not afford sufficient space for the comfortable lodging of its crew.

"The bearing of this subject on the propagation of disease on board ship has not attracted sufficient attention, at least in our mercantile navy: while our war-ships have been undergoing continual improvements in their sanitary arrangements, and emigrant vessels are placed by law under inspection, ships exclusively engaged in commerce have been left entirely without regulation in these important matters, apparently from public attention not having been sufficiently directed to the subject.

"If we consider that ships are in reality floating buildings, and those of the mercantile class usually of a worse construction than any which exist in our towns; that they have no provision for ventilation; that they are generally kept in a filthy condition; that, though requiring constant drainage, as much as any private dwelling does, there is no regulation whereby this is secured; that, when in port, and especially in river harbours, which receive the drainage of towns, a portion of water already stagnant, or of diluted sewerwater, is sure to pass in by way of leakage, and evolve the usual unwholesome gases; (Appendix 5, p. 155), and that even putrid mud has been found covering the bottoms of such vessels; in short, when we have sanitary conditions as bad, or even worse, than in the worst parts of our crowded cities and towns, we need not be surprised to find that merchant-ships are not exempt from the operation of those causes which engender disease on land, and that, when they happen to be placed in an epidemic centre, the disease, whatever it may be, obeys the usual laws of its propagation, and fastens on the ship, just as it would do on any equally unhealthy spot on shore. A foul bill of health is the consequence, and the vessel is put in quarantine at the first port where its bad sanitary reputation happens to excite the fears of the Government or people."

The preceding observations have been expressed by competent observers who have examined these vessels in port, and they all concur in representing the condition of emigrant-ships as superior to that of ordinary merchant-vessels, because the former are under Government inspection, the usefulness of which they state to be unequivocally marked. Yet an eye-witness, who, as we shall have occasion more fully to state hereafter, has had the magnanimity to make a voyage in the steerage, in order to ascertain by personal observation and experience the actual condition of the emigrant on his passage, gives the following description of one of those vessels at sea:—"Before the emigrant has been a week at sea," says Mr. Stephen De Vere, "he is an altered man. How can he be otherwise? Hundreds of poor people, men, women, and children, of all ages, from the drivelling idiot of ninety to the babe just born, huddled together without light, without air, wallowing in filth, and breathing a fetid atmosphere, sick in body, dispirited in heart, the fevered patients lying between the sound in sleeping-places so narrow as almost to deny them the power of indulging, by a change of position, the natural restlessness of the disease; by their agonized ravings disturbing those around, and predisposing them, through the effects of the imagination, to imbibe the contagion; living without food or medicine, except as administered by the hand of casual charity, dying without the voice of spiritual consolation, and buried in the deep without the rites of the Church. The food is generally ill-selected, and seldom sufficiently cooked, in consequence of the insufficiency and bad construction of the cooking-places. The supply of water, hardly enough for cooking and drinking, does not allow washing. In many ships the filthy beds, teeming with all abominations, are never required to be brought on deck and aired; the narrow space between the sleeping-berths and the piles of boxes is never washed or scraped, but breathes up a damp and fetid stench, until the day before arrival at quarantine, when all hands are required to 'scrub up,' and put on a fair face for the doctor and Government Inspector.

"No moral restraint is attempted; the voice of prayer is never heard. Drunkenness, with its consequent train of ruffianly debasement, is not discouraged, because it is profitable to the Captain, who traffics in the grog.

"In the ship which brought me out from London last April, the passengers were found in provisions by the owners, according to a contract, and a furnished scale of dietary.

"The meat was of the worst quality. The supply of water shipped on board was abundant, but the quantity served out to the passengers was so scanty that they were frequently obliged to throw overboard their salt provisions and rice (a most important article of their food) because they had not water enough both for the necessary cooking and the satisfying of their raging thirst afterwards.

"They could only afford water for washing by withdrawing it from the cooking of their food. I have known persons to remain for days together in their dark, close berths, because they thus suffered less from hunger, though compelled at the same time, by want of water, to heave overboard their salt provisions and rice. No cleanliness was enforced; the beds never aired; the Master, during the whole voyage, never entered the steerage, and would listen to no complaints; the dietary contracted for was, with some exceptions, nominally supplied, though at irregular periods; but false measures were used (in which the water and several articles of dry food were served), the gallon measure containing but three quarts, which fact I proved in Quebec, and had the Captain fined for. Once or twice a week ardent spirits were sold indiscriminately to the passengers, producing scenes of unchecked blackguardism beyond description; and lights were prohibited, because the ship—with her open fire-grates upon deck—with lucifer matches and lighted pipes used secretly in the sleeping-berths—was freighted with Government powder for the garrison of Quebec.

"The case of this ship was not one of peculiar misconduct; on the contrary, I have the strongest reason to know, from information which I have received from very many emigrants well known to me, who came over this year in different vessels, that this ship was better regulated, and more comfortable, than many that reached Canada."

The description given by the late Dr. Andrew Combe, an eminent physiologist and able expositor—a description also derived from personal experience—as to the usual state of emigrant vessels, entirely corresponds with that of Mr. De Vere.

That disease should break out and spread under such circumstances is inevitable; but the description that has been given of the general condition of merchant-ships sufficiently accounts for the excess of disease and mortality prevalent, under ordinary circumstances, both among seamen and passengers. The evidence is conclusive that sickness prevails in proportion as the passengers and crew are confined to the berths below, as is shown, with regard to passengers, by the frequent occurrence of fever among them when, from stormy weather, they are compelled to breathe the poisoned atmosphere of the cabins and berths; and, with reference to crews, the evidence of Mr. Busk is decisive on this point, when he states the fact and assigns the reason why of all the vessels in the river Thames the collier ships are the most subject to typhus, certain named collier ports furnishing 14·5 per cent. of the whole. The crews of vessels arriving after long voyages are in general immediately discharged; but the crews of colliers as a rule live and sleep on board while the vessels lie in the river; at all events the apprentices, the class most subject to typhus, are invariably required to sleep on board. These vessels, it is well known, are detained a much longer period in port than any other class of merchantmen, owing to the circumstance that when they arrive within the limits of the port of London, they wait till their cargo is sold before coming up to discharge the coals. "During this interval," says Mr. Grainger, "as only one man is required to keep watch, all the crew are sleeping at one time in the forecastle, whilst when the ship is on the voyage, half the crew are always on deck; so that after all it is the common case of over-crowding with which we have to do on board these vessels as on shore. To estimate the force with which this cause operates, it is requisite to explain that colliers thus lie in the river on an average a week or ten days; but it often happens that they are detained much longer—three weeks, and sometimes even three months. In case of long detention it is usual for the men to leave in order to find another ship; but the apprentices invariably remain.

The evidence appears to us to be conclusive that the sickness and loss of life produced by the present state of merchant-vessels might be prevented by ordinary care. A clean and well-ventilated ship is one of the most healthy of human abodes. "If proper measures are adopted," says Mr. Grainger, "there is no reason why a single case of typhus should occur on shipboard. Sailors, with respect to disease, enjoy many advantages over the labouring classes on shore; they for the most part breathe a perfectly pure air, sickly climates being of course excepted; they are well fed; they have a large amount of animal food, and they are for the most part on entering on a seafaring life a healthy and robust class." Mr. Clark, a surgeon, who has made ten voyages to India in superior vessels, states, that he has never had a single case of typhus fever on board; and the large experience of emigrant ships when properly conducted is similar.

From a schedule which we have received from the Colonial Land and Emigration Commissioners, containing a list of the ships despatched under the authority of that Board in 1848 from which returns have as yet been received, and exhibiting a view of the numbers embarked and the mortality that occurred during the voyage, together with the cause of death as supplied by the surgeon-superintendent of the vessel,—it appears that there were 75 vessels sent out by the Commissioners to the Australian Colonies and the Cape of Good Hope during the year 1848; that of this number reports have as yet reached the Board of 31 only; that the grand total of emigrants conveyed by these 31 ships amounts to 7902 souls; that out of this whole number the deaths from fever are only 3, and that the per-centage of deaths from all causes was, in adults, 0·41; children, 4·08; total, 1·50;—showing a greater exemption from disease on board these vessels than would be found among the same classes at the same ages on land.

From the information we have obtained from Custom-house officers, whose duty it is to stay on board merchant vessels—frequently a very severe one—it appears, that the Dutch merchant vessels are the least uncleanly; next to them the Belgian and some German vessels; next the American vessels, next the British; but that the most filthy of all are the Spanish and Portuguese, and the Italian vessels, particularly the Neapolitan; those nations having in their merchant shipping the most dangerous fever nests and sickly crews, who have been taught to believe that plague and epidemics in general are propagated by contagion, and to look most zealously to protection, not from cleanliness and ventilation, but from quarantine.

From the general statements made to us, however, it appears that a large proportion of the American vessels are in a better state with respect to ventilation, cleanliness, and provision for the health and comfort of the men, than the vessels of any other country. The necessity of care to secure such provision has attracted the attention of the American Government, who have already passed into a law some of the regulations, the usefulness and importance of which it has been our object to prove. We beg to call attention to the following evidence on this subject, given before a Committee of the House of Lords in 1848, on colonization from Ireland, by Robert Bowne Mintura, Esq., ship-owner and Commissioner of Emigration under the Laws of the State of New York:—

" Are you able to suggest any additional precautions which could be taken with respect to shipping, that would diminish the dangers and calamities arising from ship-fever and disease amongst the emigrants?—One great cause of the sickness on board ship is the want of ventilation; and so convinced of that are the persons in New York who have given attention to the subject, that the Commissioners of Emigration and many merchants have united in urging upon Congress that they should pass laws requiring all vessels to be provided with means of ventilation. Emigration has become a great subject of commerce, but the vessels have not been built with reference to it; they are not prepared for it properly; and the consequence has been, that in a great many instances they have no houses over their hatches, and the hatches in most vessels are the only means of admitting air, and in bad weather they have frequently been obliged to close them entirely, so that the people have been confined between decks without the possibility of ventilation, and a great amount of sickness and death has been the consequence.

" Has there been any mode suggested by which better ventilation could be given in emigrant ships?—The ships in which I am an owner have for several years past adopted a mode of ventilation with very great success, which has been by inserting in the fore part of the vessel iron tubes communicating with the between-decks occupied by the passengers: two tubes forward to receive fresh air, and two after to discharge the foul air, so that a current of air is constantly passing between decks; and it has this advantage, that when the weather is so boisterous that the hatches must be closed, those ventilators work with more efficiency than they do in calm weather; the action of the wind is stronger, and there is a constant current of air; and the ships thus provided have escaped ship-fever, although some of them are vessels of the largest class, carrying 400 to 500 passengers each.

" How long have you adopted these precautions?—The last six to eight years. We have found them perfectly successful; and upon the representations of their success Congress passed a law last year that all vessels should be provided with those ventilators, and with substantial houses built over the hatches.

" Is that a law of Congress?—It is.

"Are there any other provisions in that law to which you would wish to call the attention of the Committee?—There is one provision which I think is very important, with regard to British vessels; and that is, that the vessels should be required to have substantial decks. In many vessels a great deal of sickness has occurred among the passengers in consequence of there being only temporary decks made by boards laid upon the ship's beams. It is impossible to clean them. The cargo is placed underneath those boards; and from the decks not being caulked they cannot use sufficient water to cleanse them, and a great amount of filth has collected; and the most shocking cases of death from fever that I have known have been found in vessels of that description.

"Do your ships in general carry a surgeon?—It is not compulsory; it is voluntary. Latterly many ships have taken them.

"Do you find any difficulty in maintaining discipline amongst the emigrants?—There is difficulty. It is a very burdensome duty upon the officers.

"In those ships which carry a surgeon, is it to him that the duty is generally intrusted of maintaining order among the emigrants?—No; it is left to the captain and the officers.

"Do you think that our law could be amended in any particulars?—As regards the points upon which I would think it important that the law should be amended, they would be with reference to ventilation, requiring the introduction of such tubes as I have described, and of substantial houses over the hatches, and requiring substantial caulked decks, and waterclosets.

"In building a ship, would the application of your process of ventilation cause additional cost?—I believe that 25*l.* would accomplish it in the average of ships.

"Is it capable of being applied to existing ships without much cost?—It may be applied to any ship; and the importance of it is demonstrated at once by this fact, that the effluvium from the discharging tubes is so bad that it is very unpleasant to stand near them.

"Could they be removed from one ship to another?—It may be done; but they should be permanent in the ship. They are simply tubes of iron twelve inches in diameter, two forward, with caps for receiving air, and two with discharging caps, like Espey's ventilators; and they are worth many times their cost to the ship, in the effect of ventilation in preserving the ship from decay. It is proper to state, that this mode of ventilation was first introduced by Joseph Delaus, late master of the American packet-ship Patrick Henry."

Epidemic diseases have been nearly banished from well-regulated portions of the Navy; epidemic diseases have been equally banished from well-regulated prisons; epidemic diseases are rapidly disappearing from well-regulated workhouses. The occurrence of a single case of fever on board a merchant-vessel, and much more the spreading of disease among a ship's crew or its passengers, is *primâ facie* evidence of neglect—neglect of removeable causes of disease; causes which might be certainly obviated by simple and inexpensive means, and for the prevention of which therefore the wellbeing of large classes requires that securities should be provided.

That such securities should be provided for the crews and passengers of ships, their peculiar situation when overtaken by sickness appears to render peculiarly necessary. They are restricted to a narrow space; they cannot shift their locality; they cannot alter in any way the sanitary condition of the vessel; and they are out of the direct reach of any civil authority,—all which peculiarities seem to be special reasons calling for general sanitary regulation.

Eminent observers of former periods have recorded facts of the same nature as those of recent occurrence, and medical records abound with similar instances. Dr. Lind states, that in a frigate which sailed from North America with a healthy crew a malignant fever broke out before her arrival in England during very bad weather; this fever affected a considerable number of the men, and the surgeon's mate, boatswain, and some others died of it: in this case a seasoned crew was attacked with a malignant fever in consequence of the hatchway being shut down. Sir James Fellows states, that towards the latter end of January, 1811, two English transports (*Metcalf* and *Phyllerea*) arrived in the Bay of Cadiz from Gibraltar, having between 400 and 500 German recruits on board. They had been kept on board under quarantine for upwards of a month in Gibraltar Bay; and unfortunately on the arrival of the transports in Cadiz the weather became so tempestuous that the crews of these vessels and the soldiers were obliged to be kept below. During the few days that the hatches were covered over in consequence of the heavy rains, a complete typhus fever had been formed. In his examination by the Committee of the House of Commons, Dr. William Gladstone states, that men-of-war were formerly ballasted with shingles; that this ballast was often not shifted for many years; that when it was turned it produced fever in several of the ships; and that this fever assumed the character of the prevailing fever of the station (whatever it might be) at which the vessel happened to be at the time. Sir John Pringle states, that he has observed a mortal fever to arise in the hospital of an army, not only when crowded with sick, but at any time when the air is confined, and especially in hot weather. "I have observed the same sort to arise," he adds, "in full and crowded barracks, and in transport-ships when filled beyond a due number and detained by contrary winds; or when the men have been kept long at sea under close hatches in stormy weather. For this reason hospital-ships for distant expeditions have been generally destructive both to the sick and their attendants."

It is observed in the Sanitary Report, that "So dreadful was once the condition of the royal navy, that in the year 1726, when Admiral Hosier sailed with seven ships of the line to the West Indies, he buried his ships' companies twice, and died himself of a broken heart. Amongst the pictures then presented, as in 'Anson's Voyages, 1740–44,' were those of deaths to the amount of eight or ten a-day in a moderate ship's company; bodies sewn up in hammocks and washing about the decks, for want of strength and spirit on the part of the miserable survivors to cast them overboard. Dr. Johnson, in the year 1778, thus describes a sea life:—'As to the sailor, when you look down from the quarter-deck to the space below, you see the utmost extent of human misery; such crowding, such filth, such stench! A ship is a prison, with a chance of being drowned—it is worse, worse in every respect—worse air, worse food, worse company.' "

A foul ship is not only a centre of disease to those on board, but a source of disease to her neighbourhood. From a variety of evidence it appears indisputable that while the foul state of a ship's hold is the frequent cause of malignant fever to her crew, the air issuing from such a hold, and the cargo taken from it, are capable of producing disease in the neighbourhood of the wharf where the unloading takes place, and of affecting persons who come on board from the shore. Observations of this kind have led to the apprehension and belief that epidemic diseases may be introduced from one country into another in this manner; and, were this possible, the actual condition of ships in general would afford the most perfect nidus for the incubation and development of pestilential virus that human ingenuity could devise. That a foul ship should produce disease in those who go on board of her or near her, is no more surprising than that a foul chamber should do so. As one of innumerable instances of the like class, we may cite the case detailed in the Report of the Committee of the House of Assembly of New York, in illustration of the statements commonly made on this point.

It is reported, that "the ship *Fame* arrived at New York from one of the West India islands, in the latter part of July, and came to the wharf next below New Slip and lay there for some time, and on the 3rd or 4th of August her ballast was discharged and she pumped out. In her ballast was damaged coffee, extremely putrid which, with the water from the pumps, was so offensive to the smell that the neighbours were induced to shut their windows, especially while eating. On the 6th a number of persons spent the most of the day at Henry Mead's house on the lower corner of the west side of New Slip, where the disease appeared first, subsequent to its appearance in Coenties Slip, and dined there, and while at dinner they were under the necessity of shutting up the doors and windows, though the weather was very warm, so exceedingly were they annoyed by the stench from the slip. Of this company not one escaped the disease, and two of them died. In the house and the then adjoining houses eleven persons took the disease, and five of them died. And many of the boatmen whose vessels were in the slip at the same time were also victims to this stench, or the contagion it produced."

Such examples as these compel us to submit as a principle of administration, that the ship in port or at anchor, and in communication with the shore, comes within the principle of the Epidemic Diseases Prevention Act, and should be dealt with for those purposes as a dwelling on shore.

Had the occurrence of attacks of cholera on board the merchant-vessels from the Baltic continued in any considerable number, we should have felt it our duty, as the cases were similar, to apply to them similar regulations to those issued for the prevention of the spreading of the epidemic on shore. The measures requisite were the same, namely, the dispersion of the overcrowding, the removal of the sick, and of those threatened with sickness, to purer air and less crowded habitations on shore, if, as would commonly be the case, suitable accommodation should not be obtainable afloat.

In England and Wales, at whatsoever port or part of the coast a vessel might touch, the services of a medical officer of the Union would be available. The difficulty in the way of the adoption of these regulations was the doubt as to whether the Act gave power to impose upon the owners of ships expenses similar to those with which the owners of tenements are chargeable for the execution of the provisions of the Diseases Prevention Act.

By 7 & 8 Vict. cap. 112, sec. 18, it is enacted that the owners of ships shall provide medicine ; that every ship having 100 persons or upwards on board shall provide a surgeon ; and that certain ships, having 50 persons on board, shall provide a surgeon. The provision therefore which we recommend is in accordance with the principle of the existing law.

Whatever may be the amount of those expenses with reference to ships, they would on the largest scales be reductions of the grievous expenses and inconveniences of the regulations and practice of quarantine. We have appended the draft regulations which we propose (Appendix 7, p. 157), for the consideration of their practical working. From these regulations it will be seen that we would suggest, that statutary authority should be given for provision that on the arrival of any vessel in port, having on board, or having had since leaving the port from whence she last cleared out, any case of epidemic, endemic, and contagious disease, as ascertained by the officer of customs, it should be obligatory on the captain to convey a notification of the case of sickness either to the medical officer already in the service of the Custom-house authorities, or to the medical officer of the Union, or district of the Union, and to bring such officer in the ship's boat to the vessel. The medical officer should then take immediate charge of the sick, not continuing the crowding, nor enforcing protracted confinement in a foul atmosphere by means of quarantine regulations, as was done in the case of the *Eclair*, but dispersing the sick, and causing their immediate removal, when they are in a fit state for removal, either to the well-aired and well-provided wards of an hospital, or to properly prepared rooms in some private establishment. The medical officer should further examine the sanitary condition of the ship, report upon it, and order and superintend the execution of all such measures of purification and cleansing as may be necessary to place her in a healthy state, and as would be done in the case of an ill-conditioned lodging-house or dwelling which had proved to be the source of epidemic disease.

Before we were relieved from the pressing consideration of the occurrence of cases of epidemic diseases on shipboard, at sea as well as in the ports, our attention was arrested by the occurrence of the smothering of a number of passengers on board a steam emigrant-ship, the City of Londonderry. That occurrence we could not but consider, dreadful as it was, an example of the ignorance, which we have found to be common, of the primary condition on which health and life depend, namely pure air, and of the simple appliances by which it may be secured.

In relation to this particular instance, we must state that it was extraordinary only in its magnitude, and in the extent of its immediate consequences. Cases of permanent injury to passengers are as frequent and common amongst emigrant and passenger ships as storms. The instances of large losses of cattle, from the effects of the like ignorance and carelessness, we are informed are still more frequent. Dr. Duncan, with reference to the port of Liverpool, states, "It is well known that numbers of cattle are annually smothered on their transit from Ireland to this port. No statistical data are at present available on this point, although the corporation are about to adopt regulations which will enable such information to be obtained for the future. But the Inspectors of Meat state that in some years they have known as many as four hundred head of cattle to be landed in a smothered state."

Occupied as we were with evils which appear to be as great, though unobserved and less striking in their incidents, we could not but feel it a duty to step out of our course to consider of a remedy. The principle of the simple mechanical appliances available as a remedy are described in an able paper prepared at our instance by Dr. Arnott (Appendix 2, p. 144), accompanied by evidence as to its practical working which we have obtained from the records of the Admiralty, which we submit as deserving of careful attention. This exposition of the principle of ventilation applicable to large numbers of persons, with the evidence of its success, we have transmitted wheresoever we saw any probability of its voluntary adoption.

As exemplifying the slow progress of the adoption of proved improvement, it is our duty to represent that the trial of the ventilating pump was made and reported upon in 1843, and that the calamity on board the transport-ship the 'Maria Somes' happened in 1846. This ship having been overtaken by a hurricane, it was "deemed indispensable for the safety of the troops and their families to order them below, and to batten down the hatches." After an examination of the circumstances of the case, it was officially reported that, "deplorable as has been the loss of life through the adoption of measures had recourse to for adequately providing for the general safety, it is the opinion of competent naval authorities on the spot, to whom the details had been referred, that the sacrifice was unavoidable under the circumstances." We submit the answer to this is the experience of the 'Anson,' which had been reported to the Admiralty nearly three years before. (See Appendix 3, p. 152 *et seq.*)

We have reason to believe, from the reports made to us on the recent outbreak of cholera on board the hulks, that the same observation is applicable to the want of proper means for supplying these vessels with fresh air, particularly at night.

We have come to the conclusion that no ventilation which is to depend on the ascent of heated air, or barometric changes of the atmosphere, or any other which we have seen than the regulated removal of the air by the pump, or some other mechanical means, is to be relied upon as efficient under all circumstances.

Keeping in view the main object of our commission, the prevention of the generation and spread of epidemic diseases on shore, and looking for aid to public opinion in the execution of the requisite regulations, we cannot but regard the instances of the occurrence of epidemic diseases on board ships as disastrous (beyond the suffering of the immediate victims) in their effect on the popular belief; the occurrence of epidemics amongst those moveable populations, afloat as well as on shore, being commonly regarded as examples of the importation of epidemic diseases, and as evidence of the quality of contagiousness which is possessed only by certain specific and well-ascertained diseases. The cases of typhus which so frequently occur in colliers trading between Newcastle and the Thames no one supposes to be imported from the coal-pits; but if they had come from Alexandria it would by some be affirmed that they were proofs of the presence and activity of imported febrile if not plague virus. In this view alone, of removing this fertile source of unfounded and misleading apprehension and alarm, the application of sanitary regulations to the prevention of epidemic diseases on shipboard at sea has appeared to be of importance to all nations, as well as to this country. But we have had experience of the practical difficulty in the execution of almost any regulations whatsoever on shipboard or beyond the ports. Whilst dealing with the cases of cholera occurring on board the vessels from the Baltic in our own ports our attention was drawn, as we have before stated, to cases that took place at sea, and to numerous preventible cases of sickness and death amongst the seamen while in the ports of the Baltic, where cholera was epidemic. It appeared to us to be requisite that measures preventive of disease in the English ports or among English crews and passengers in the open sea should be commenced within those foreign ports. For that purpose we framed regulations with a view to their voluntary adoption by the masters of merchant-vessels, and transmitted them to our consuls at the several ports for them to circulate. These regulations were carried out by the General Steam Navigation Company. We hope and believe that they were adopted by intelligent masters of ships to such an extent as fully to compensate for the labour which was bestowed upon the subject; yet we are compelled to state, that a large proportion of the shipping appeared to be under the direction of ignorance and carelessness little short of that which led to the dreadful catastrophe above noticed, and that we must despair of the voluntary adoption of any care or regulations for indefinite periods, unless the entire mass of the merchant-vessels are put under the same degree of supervision as only certain portions of them are at present.

The ignorance of a great proportion of the captains of merchant-vessels is described by experienced witnesses to be such as to exclude the access of information, at least by any such instructions as could then be obtained, or devised with the advice of persons of experience in dealing with the class of persons to be addressed.

Nevertheless, the experience of the mercantile navy itself affords an example of the successful practical working of a large preventive principle of jurisprudence; that is to say, the principle of concentrating responsibility on those who have a direct interest in prevention and who possess the best means of securing it. We would request attention to those examples, as subjects for international consideration.

It is stated that when the system of transportation was first adopted, in some of the earlier voyages full one-half of those who embarked were lost; later on the passage to New South Wales, as in the 'Hillsborough,' out of 306 who embarked 100 were lost, and in another ship, the 'Atlas,' out of 175 embarked 61 were lost. Yet there were no omissions palpable to common observation, or which could be distinctly proved as matter of crimination to which responsibility might be attached. The shippers were no doubt honourable men, chargeable with no conscious designs against the lives of the human beings committed to their care, and with no unusual omissions, but their thoughts were directed by their interests exclusively to profits: they got as much freight as they could, and they saw no reason why convicts or emigrants should not put up with temporary inconveniences to make room for cargo.

By a simple change (based on the principle of self-interest, the most uniform, general, and, when properly directed, really beneficent of all principles of action), by the short alteration of the terms of the contract, so as to apply the motive where alone there was the effectual means of prevention, by engaging to pay only for those *landed* alive, instead of paying for all those *embarked*, these extreme horrors were arrested; the generation of extensively mortal epidemics was in a short time prevented; and clean bills of health might have been given to all the ships which before would have been entitled to none. From the report of the Select Committee on Transportation, in the year 1812, it appears that in one subsequent period, namely, from 1795 to 1801, out of 3833 convicts embarked, 385 died, being nearly 1 in 10. But since 1801, after the principle of responsibility began to be applied, out of 2398 embarked, only 52 have died, being 1 in 46. The improvement has continued up to the present time, when it amounts only to one and a half per cent., or even lower than the average mortality of such a class living on shore. The shippers themselves, without any legislative provisions, or any official supervision or regulations thereto, appointed medical officers, or surgeons, and put the whole of the convicts under their charge; the shippers attested their own sense of the propriety, sound policy, and efficiency of the principle, by voluntarily adopting it and applying it to each ship-surgeon in charge, whose remuneration was made dependent on the number of passengers landed alive.

The alteration, stimulated by the self-interest of the ship-surgeons or officers engaged in that service, led to highly important practical results as to the means of securing health and preventing disease. In the course of the sanitary inquiries which have served as the basis of legislation, a surgeon who had the charge of transport-ships described the toils of his service during long voyages, his sleeplessness on stormy nights, his getting out of his hammock to see that the wearied sailors, whom he would not trust to themselves, took off their wet clothes and put on a proper change before they turned in; and he narrates how he was complimented on his sentiments of active benevolence, when he frankly owned that he was really only entitled to praise for vigilance to his own interests. Some benevolent and intelligent shipowner had taken care that the sailors as well as the passengers should be included in his contract for remuneration. He acknowledged it was that which kept his thoughts intent on the means of preserving their health as well as saving his own trouble in merely treating illness when it occurred, which alone, in consequence of a vicious short-sightedness, is ordinarily considered the surgeon's sole duty, and not that of giving general advice or directions for the preservation of health.

In cases of contracts on these terms for the transport of troops, where the officers in command had forgotten to provide surgeons for their care, the pecuniarily responsible shippers had not failed to provide them.

The same principle of pecuniary responsibility has also been partially applied to the transport of pauper emigrants with complete success, as far as the experiment has been made, affording a result which stands out in strong contrast with the horrible events on board vessels where this principle has not been applied.

There is strong reason to believe from recent experience that the general adoption of this principle in its full extent would do more to meet the formidable difficulties of these emigration ships than the best devised system of inspection in the absence of this principle. The anxious attention of Government has lately been called to the subject, and they appear to have been guided in the course they have adopted in a considerable degree by the opinion of a gentleman who has qualified himself in the best manner to offer counsel. The late chairman of the Emigration Commission, T. F. Elliot, Esq., in his examination by a committee of the House of Lords, says:—"One of the most important pieces of evidence upon emigration which I have ever seen in my life was contained in a letter which I received from Mr. Stephen De Vere. He is a private gentleman who has gone from Ireland to Canada, wishing to judge for himself whether it was a good place to which to encourage his poorer neighbours to proceed. He voluntarily exposed himself to the inconvenience and hazard of taking his own passage in the steerage, and after his arrival he wrote to me, at my request, a very full letter, giving an account of all that he observed. This letter has, I think, weighed much with the Government in forming the conclusion that it was desirable to endeavour to amend the law in the course of the present Session."

Mr. De Vere, in the letter referred to, says:—"Having myself submitted to the privations of a steerage passage in an emigrant ship for nearly two months, in order to make myself acquainted with the condition of the emigrant from the beginning, I can state from experience that the present regulations for ensuring health and comparative comfort to passengers are wholly insufficient, and that they are not and cannot be enforced, notwithstanding the great zeal and high abilities of the Government agents."

To his description of the consequences we have already had occasion to refer. "Some of those evils," he says, "might be prevented by a more careful inspection of the ship and her stores before leaving port; but the provisions of the Passenger Act are insufficient to procure cleanliness and ventilation; and the machinery of the emigration agencies at the landing ports is insufficient to enforce those provisions and to detect frauds. It is true that a clerk sometimes comes on board at the ship's arrival in port; questions the captain or mate, and ends by asking whether any passenger means to make a complaint; but this is a mere farce, for the captain takes care to 'keep away the crowd from the gentleman.' Even were all to hear the question, few would venture to commence a prosecution—ignorant, friendless, pennyless, disheartened, and anxious to proceed to the place of their destination."

While Mr. De Vere thus bears testimony to the activity and ability of the Government Agents, he shows that their exertions to carry out the provisions of the legislature fail, among other reasons, because the emigrants on landing are not in a condition to render them the requisite assistance. We recall attention to his words:—"Few," he says, "would venture to commence a prosecution—ignorant, friendless, pennyless, disheartened, and anxious to proceed to the place of their ultimate destination." Mr. Elliot takes the same view:—"The emigrant upon landing," he says, "is so eager to proceed to his destination to obtain employment, that he is reluctant to remain for the purpose of instituting any prosecution; even in the event of the appointment of an officer to prosecute for offences against the Act, the passenger must often be a witness to prove the fact, and this must operate much against an effectual enforcement of the law."

But even if there were no difficulties in the way of instituting prosecutions, we much doubt whether this system could afford effectual security against infringements of the law. We have already seen the extent to which the intentions of the legislature are defeated, and to which its enactments for the prevention of scurvy prove inoperative. Vigilance may do much before the embarkation, and something on the landing; but it is when at sea—it is during the passage—the very time when it is most needed—that this system most fails in providing securities for the due observance of the law. Fixed arrangements as to the minimum space for breathing-room to be secured to each passenger, in themselves very fallacious regulations as securities for ventilation, and often occasioning an expensive waste of space, are reported to be observed only during the continuance of inspection, and together with the regulations as to rations are more or less neglected at sea, wherever there is no sufficient interest for their enforcement. But were the principle we have advocated applied—were contracts made, and no contracts allowed except on the principle of payment in proportion to the numbers landed in good health, and the forfeiture of the passage-money of every person whose death takes place on board, we have already sufficient experience of the operation of this self-acting principle to warrant the conclusion that ventilation, the avoidance of over-crowding, the supply of wholesome food and sufficient water, and the appointment of a superintending surgeon, responsible for the order and the proper observance of sanitary regulations on the part of the passengers, would frequently, or with large numbers, be spontaneously and well provided, with adaptations which could not be foreseen for all contingencies, or be met by fixed arrangements.

Practically, no difficulty was ever found in getting contracts taken on these terms, especially by respectable shipowners, and their working has uniformly been found by them to be satisfactory. We can have no hesitation, upon such practical experience, in submitting the expediency of its application to ships of every description, as a general principle of legislation.

We should propose that in no cases should passage-money be payable in the event of death, and that in every case of death the passage-money shall be returned, any contracts to the contrary notwithstanding.

By no agency which the legislature might place at our disposal, by no regulations which we on the most complete information and competent advice might adopt, could we hope to see such extensive sanitary effects generally produced out of port and on shipboard, as by the application of this efficient principle of legislation.

The principle proposed is in accordance with that expressed in the common law maxim that freight was the mother of wages, under which formerly no wages were payable in respect to vessels which were wrecked, and which are not now payable as a matter of course, or except under the special of proof by a certificate that the seaman had exerted himself to the utmost to save the wreck, the implied contract for payment being that the voyage shall be completed to entitle the seaman to wages; so, in the case of the passenger, we propose that it shall be the implied contract that the party shall, at all events, be landed alive, to justify the payment or retention of passage-money. The principle would, indeed, be in accordance with the recognized principle of common law in respect to wages, that where there has been no benefit given or completed there shall be no payment.

The principle has been partially applied in another form in the Act first proposed by Lord Lyttleton and afterwards carried by Lord Campbell for securing compensation to survivors; and competent observers of its working in railroad management declare that it has been attended by increasing care and efficiency in measures of prevention, such as could not have been expected from any form of official supervision or authoritative control, and that life must already have been saved by it. If we were to concede (which we do not) that accidents or the outbursts of epidemics at sea were really not preventible, or that preventive measures required expensive arrangements, these would, in practice, be met by a proportionate insurance charge and increased fares, which indeed would operate as bounties on prevention.

To respectable shippers the arrangement would be far preferable to the alternative of interferences by administrative agencies for the execution of *à priori* regulations, which are evaded and disregarded by the lower class of shippers when they are out of port. The principle of pecuniary responsibility is self-acting; it reaches where they could not reach, and renders arbitrary and troublesome regulations unnecessary. It is awake and active when authority and public attention and benevolence are asleep and powerless.

The concentration of the principle of responsibility would, through their interests, direct the attention of parties who have the best means of applying them to measures for improving the transport of passengers. It would be the best corrective of the mere ignorant inattention of rude men. In those cases where Government inspectors or an instructed supervision were provided and regulations authorised, the regulations would be cordially received, and well-considered suggestions and information would be often more than equivalent to positive enactments.

From the general application of the principle which in its particular application was found so efficient in the prevention of epidemic disease on shipboard, merchant-ships would be entitled to clean bills of health at the least as generally as ships of war. It may be confidently averred that in real international security such a principle, if generally carried out, would be more effectual than the most powerful cordons sanitaire that have ever been adopted, or than any systems of quarantine that exist.

When infected persons from infected ports did get on board vessels under the like responsibilities and care, they would find themselves placed immediately under circumstances calculated to mitigate and extinguish the infection, instead of coming, as they do in the more numerous and lower classes of vessels, into a nest in which fever is fostered, and from whence it spreads.

Besides the saving of sickness, misery, and death, amongst passengers and crews at sea, the public mind in civilized countries would be relieved from the pernicious influence of the greater proportion of the fallacious examples of the importations of disease generated on board ill-conditioned ships, and the train of false securities, misplaced fears, and social evils connected with the common doctrine of contagion.

Nevertheless, arriving and anchoring, as vessels must we fear continue to do for a long time, in or near sewer-mouths and near ill-conditioned places—considering, too, the habits of sailors on shore—we must expect and provide against the continuance of attacks of epidemic disease in port; and this we propose to do on the same principles and by the same means as those which have been found effectual for the prevention of the spread of epidemics on shore.

The substitution of the sanitary regulations which we propose for the existing system of quarantine, though the expense that may fall on those particular ships which, through neglect or mismanagement, continue to have outbreaks of epidemic disease, were much larger than we contemplate as possible, must effect a large ultimate economy even of money; while it would at once put an end to those grievous inconveniences and anxieties to which the public are at present subjected, we think, unnecessarily, and without any compensating advantages.

Instead of detaining all vessels whatsoever arriving from ports which may happen to be the seats of epidemic disease, we propose to detain only the persons who may be in an actual state of ill health, or labouring under epidemic disease. Instead of keeping the parties infected together on board their own vessel, or in a building of the description of those used as lazarets, we propose that they shall, as far as practicable, be immediately separated, and removed to places where the air is pure, and where suitable accommodation may be provided for them. Instead of arresting vessels which arrive at a port distant from a quarantine station, and keeping passengers together who may be in a state of disease until they are sent to a distant quarantine station, we propose that medical attention shall be given at once on the spot, and for their own proper relief in the first instance, and not as sacrifices to the false notion of security to persons on shore.

Instead of restricting authoritative care to certain epidemics from distant countries, and omitting attention to all others, we propose that immediate attention and relief should be provided for all cases of epidemic disease whatsoever, as well to those which may be contracted in port as to those which are brought into it.

Instead of detaining cargoes, we propose their immediate discharge (cargoes in a state of putrescence only excepted), universal experience, as has been fully shown, without the exception of any place in any season or country, having exhibited no one case, or even the allegation of one, where the persons employed in opening packages of goods at quarantine stations have ever been attacked with plague, yellow fever, or cholera, or any other supposed contagious disease therefrom.

From the communications already alluded to which have been made to us by captains of foreign vessels it appeared that, whilst clean bills of health were refused at the Port of London, on account of the prevalence of cholera after it had ceased, clean bills were given to vessels departing from ports where we were aware that the disease prevailed in the most severe form, but where the fact had not been notified to the foreign consuls. We are otherwise aware that clean bills of health have been and are commonly given to vessels sailing from ports where epidemic diseases are rife—sailing to countries where the most zealous quarantine regulations are enforced on the slightest suspicion of the existence of such disease in any port of departure. In like manner we have reason to believe that our own vessels have regularly been admitted which have touched at minor ports where the plague has broken out, but has not been declared or officially notified. When the whole of the difficulties of maintaining a rigid quarantine, and the strength of agency requisite to obtain correct information as to outbreaks of the disease and to take the requisite steps are considered, it may be doubted whether an instance exists of any large or populous kingdom where a complete quarantine has at every point been maintained at any one time. We may further mention that instances have been stated to us in which isolated or simulated cases of epidemic disease have been made use of abroad to justify quarantine for the detention of vessels and cargoes to job and influence markets.

We are advised by customs' officers and other competent persons that there is at present, as there might be expected to be, such extensive evasions of the quarantine regulations as to render them a nullity for any protection on the theory of contagion. The whole of the passengers and crew being exposed to grievous inconvenience on account of the sickness of individuals, it is the practice to prevail on the sick to misrepresent the nature and cause of their sickness; thus, rheumatism, catarrh, scurvy, diarrhœa, sea-sickness, are frequently assigned for febrile and epidemic attacks. When those only are dealt with who are sick, or affected with premonitory symptoms, and dealt with by appropriate treatment, having regard mainly to their own benefit, and not in such a manner as to alarm them and to lead them to imagine that they are to be sacrificed to a feeling of apprehension in behalf of others, we may fairly expect less of concealment, and, so far as the absence of concealment is concerned, less of real danger of the escape of cases of malignant epidemic than under the present system.

With the aid of the principle of legislation to which we have referred, with the tutelary motive supplied by responsibility on the part of the owners or the shippers, it may be anticipated that less of authoritative or stringent regulation would be necessary, and that suggestions and information would receive that general voluntary adoption which they now frequently receive from the most intelligent captains and owners.

Having carefully examined what appeared to be the best available evidence as to the facts on which the system of quarantine rests, having considered the Report made to the Royal Academy of Medicine in France, and the written testimony of the most eminent professional and scientific observers and writers, as well in Austria and America as in England, we have now to report as our conclusions,—

That the chief pestilence in respect to which quarantine establishments have been kept up in this country, the Oriental plague, is, in its antecedent circumstances or causes, in the localities, classes, and conditions of the population attacked, and in its rise and progress, a disease of the same essential character as typhus, being according to the most recent authorities who have had practical experience of the malady, a form of that disease modified and rendered more intense by peculiarities of climate and of social condition.

That the notion of the propagation of the plague by means of goods appears from one uniform mass of evidence to be as entirely unfounded as the opinion which formerly prevailed in this country that typhus could be propagated in the same mode.

That the true danger of the propagation of plague is not by contact of the affected with the healthy, but by exposure on the part of susceptible subjects to an infected atmosphere, under the like conditions which are known to produce and propagate typhus fever in this country.

That the quarantine establishments in this country, and every other of which we have information, are wholly insufficient, even on the assumption on which they have hitherto been maintained, to prevent the introduction and spread of epidemic disease.

That these establishments are of a character to inflict on passengers extreme and unnecessary inconvenience, and to subject such of them as may be sick to increased suffering and danger, while they maintain false securities in relation to the means of preventing the spread of disease.

That typhus and other dangerous epidemic diseases are frequent on board merchant-seamen vessels at sea and in port, for which no effectual or suitable provision is at present made.

That as far as relates to the cases of epidemic diseases generated at sea, the principle of the concentrating of responsibility on the shippers, in making it their pecuniary interest to complete the voyage with healthy passengers, operates most effectually in the cases where it has been applied, such as to emigrant, transport, and convict ships, and should be extended to all cases; and that in respect to ships in port, the regulations applied to the prevention of the spread of epidemic diseases from houses in towns are applicable, and would practically be highly beneficial.

That the substitution of general sanitary regulations to ships in port, for the existing quarantine regulations, would far more effectually extinguish epidemic disease, and afford better protection to the uninfected on shipboard, whilst it would relieve passengers and crews from grievous inconvenience, abate the motives to concealment of sickness and to false representations as to its nature, greatly lessen commercial expenses, and remove obstructions to the free transit of goods and uninfected persons which the existing system of quarantine occasions.

It follows that we propose the entire discontinuance of the existing quarantine establishments in this country, and the substitution of sanitary regulations.

By such substitution the most effectual security which the present state of knowledge affords would be taken against the importation of foreign contagion, the maintenance of infection, and the origin and spread of epidemic disease.

The British Parliament has legislated on the conclusion, submitted with an accumulation of demonstrable evidence, that the causes of epidemic, endemic, and contagious diseases are removable, and that the neglect on the part of the constituted authorities to remove such causes, as far as they are obviously within their control, is a punishable offence. The foundation which the legislature has thus laid for the physical, and consequently for the moral, improvement of the people is recognised. Half a century ago it was said by a great physician and philanthropist to whom we have already referred that the time would come when the legislature would punish communities for neglecting the known means of preserving the public health, and that prediction the British Parliament has been the first to realize.

"To all natural evil," says Dr. Rush, "the Author of Nature has kindly prepared an antidote. Pestilential fevers furnish no exception to this remark. The means of preventing them are as much under the power of human reason and industry as the means of preventing the evils of lightning and common fire. I am so satisfied of the truth of this opinion that I look for the time when our courts of law shall punish cities and villages for permitting any of the sources of malignant fevers to exist within their jurisdiction."

We believe from such information as we have been able to obtain that the immediate adoption of the changes which we now recommend would be attended with no difficulties or inconveniences commensurate with the advantages that would accrue from the relief to commerce, the freedom of international communication, and the security of the public health.

All which we humbly certify to your Majesty.

(Signed) CARLISLE,
ASHLEY,
EDWIN CHADWICK,
T. SOUTHWOOD SMITH.

APPENDIX.

1.—*Letter from the General Board of Health to the Lords of the Privy Council on the Practice of Quarantine in England.*

The General Board of Health,
Gwydyr House, Whitehall, November 9, 1848.

Sir,

The General Board of Health have considered it to be their duty to represent to the Lords of Her Majesty's most Honourable Privy Council some circumstances which have been brought under the notice of the Board connected with the manner of enforcing Quarantine Regulations.

The Board would have made an earlier statement on this subject had they not been most urgently and exclusively occupied in making preparation for meeting the present visitation of cholera; and as the Quarantine Regulations have, for some time past, ceased to be in force, they trust that no inconvenience will have resulted from this delay.

The Board beg to observe, that though they have been compelled to have much verbal communication with persons connected with shipping, and to hear complaints respecting Quarantine generally, yet the statements they have to make on this occasion relate to the manner in which the Quarantine Regulations have been carried into effect, in one or two instances, connected with cholera.

The subject to which the Board would call the particular attention of their Lordships is the apparent want of provision for affording medical assistance to the crews of vessels and the passengers on board vessels placed under Quarantine.

It has been stated to the Board, that the Quarantine grounds on the Humber, for example, are distant from the port of Hull eight miles seaward; that, in stormy weather, they cannot be visited every day except by steamers, and that they are situated on the opposite shore (Lincolnshire shore), and have only a very indirect and uncertain communication by land with Hull.

That by a recent Order in Council, not only vessels for the Humber but others from Shields and Sunderland, were ordered to these Quarantine Roads to complete their Quarantine, and that, consequently, a considerable number of steamers and other vessels were, at that time, constantly there.

That these vessels were attended by the revenue cutter "Ravère" (a Quarantine Hulk), but that she has no medical officer attached to her.

That under the most favourable circumstances, it would not be possible for the cutter's boat to come up to Hull for medical assistance, and to return again on the Quarantine grounds under three hours and a half or four hours; that were the wind and tide against them, they could not come at all; and were the wind for them, but the tide against them, it would take them at least six hours to complete their voyage.

Such vessels being placed in Quarantine on account of their having come from infected ports, all the persons on board must have been exposed to an infected atmosphere; and it is therefore probable that some of them have already inhaled the seeds of disease, and that only a few days or even hours may be necessary for the full development of the malady. Several instances, indeed, have occurred of persons leaving Hamburgh apparently in perfect health, who were seized with cholera on their passage to Hull. Some of them being in a state of hopeless collapse, and others dead, on the arrival of the vessel at that port.

It must be further borne in mind, that the anxiety and fear excited in many persons by the very circumstance of their being placed in Quarantine would probably operate on some of the passengers as powerful predisposing or concurrent causes, both of cholera and other diseases.

It appears, indeed, to be a general opinion among medical men, that the emotions of anxiety and terror act more powerfully in predisposing to cholera than to other diseases. Mr. Grainger has reported a case which exemplifies the feelings not unnaturally excited in the passengers of vessels on being placed in Quarantine. A young unmarried lady, who, after having been accompanied on board a steamer at Hamburgh, proceeded to England, where the vessel was placed in Quarantine, thus writes,—"It is all very well to say, don't be afraid of the cholera; but those who have seen what I have within these last few days will feel differently. On our arriving at Gravesend, a Custom-house officer came alongside and told the captain the ship must be kept in Quarantine, and that if he allowed any of the passengers or crew to land, he might be shot. They then took away our letters without coming on board, and said, they would send every day for the letters. You can imagine our consternation and alarm, and then the horrid yellow flag! and we were told that if any one was taken ill, or died, we should be detained, I know not how long! Another ship was near us also in Quarantine, and with a sailor in it, who had died. Soon we saw this ship moving slowly down the river to the Nore that the body might be committed to the deep: although it rained in torrents, we saw all the passengers standing on the deck as they were afraid to go below for fear of the cholera. If you could have seen that melancholy sight! I never shall forget it. Need I endeavour to paint to you our feelings, not knowing how soon we might be in the same sad predicament. How we counted the hours, and how we rejoiced when the welcome news reached us that we might land once again in England!"

Considering the fearful rapidity with which cholera runs its course, it does appear to the Board to be a defect to place a number of persons who have been exposed to the cholera poison in a situation in which, even in the day-time, and under the most favourable circumstances, they cannot be reached in less than three or four hours; and under unfavourable circumstances, scarcely within six hours. The inspector of the river indeed says,—"it would, in general, be eight or nine hours." But the difficulty and delay must be still greater, if any persons on board these vessels are seized suddenly during the night, which experience shows is the time when the subjects of this formidable disease are most commonly attacked.

It appears to the Board, that if wayfarers, passengers, merchants, and foreigners are subjected to the anxieties of suspicion, the disadvantage of confinement, and the inconvenience and loss of delay for the presumed safety of the public, justice requires that all practical precaution should be taken for lessening their danger, affording them assistance, and mitigating the evils of their unfortunate position.

Mr. John Edwin Burt, inspector of the river of the port of Hull, states as follows:—

"All vessels arriving from foreign parts which render them liable to Quarantine proceed at once to the Quarantine ground at Whitebooth Roads, in the river Humber, where the usual questions are put to them, and where they await the directions of the Lords of the Council as to their immediate release, or the amount of Quarantine which shall be performed by them. All other vessels proceed to the boarding stations, when they are visited by the Custom-house officer, and questioned as to the health of the passengers and crew. If the answers are satisfactory, a certificate is granted, and they proceed at once to their destination."

Being asked, "If a vessel were to arrive with cholera on board, at what distance from Hull would you put her in Quarantine?" he answers—

"In Whitebooth Roads, about seven miles from Hull.

"In such a case have you power to send a medical attendant on board?—Not if she had brought a clean bill of health, though under such circumstances I should take upon myself the responsibility of doing so.

"Should a vessel arrive with the body of a person who had died of cholera on board, would you have any power to send a medical man on board in order to ascertain whether any of the men had the premonitory symptoms of cholera?—I have no such power under the existing regulations.

"Suppose the premonitory symptoms of cholera were to break out on board of a vessel at the Quarantine station, would you be likely to hear of it?—No; but if the disease went on to cholera I should be informed, and assistance might arrive on board the affected vessel in eight or nine hours, more or less, according to the state of the tide or the engagements of the Quarantine boat."

On the 30th September, the following letter was addressed to the Collector and Comptroller of Customs at the port of Hull.

"Victoria Hotel, Hull, September 30, 1848.

"Gentlemen,

"It having come to our knowledge that the captain of the ship 'Cato,' from St. Petersburgh, died on the voyage on September 20th, and that the dead body was still on board the vessel, which arrived in the Humber on Thursday, the 28th, we deemed it to be our duty to request Mr. Burt, in your absence, to allow Mr. Hardy, the Medical Superintendent of Quarantine, to proceed immediately on board, for the purpose of making a medical inspection of the crew.

"We beg also to express our opinion that as several cases of Asiatic cholera have occurred within the last week in this port, and as the disease prevails at this time in some of the ports of the Baltic and North Sea, it is actually necessary that the Medical Superintendent should inspect all ships coming from such ports, in order to ascertain if any of the crews are labouring under sickness, and, if possible, to prevent any incipient attack from running into the aggravated form of cholera.

"We have the honour to be, Gentlemen,
"Your most obedient Servants,
"R. D. Grainger.
"John Sutherland."

To this letter the following answer, bearing date "Council Office, Whitehall, Oct. 2, 1848, was returned:—

"I am to acquaint you that the Lords of the Council are of opinion that instructions should be given by the Commissioners of the Customs to the proper officers of the Customs at Hull, to allow the Medical Superintendent there to visit all such vessels arriving as aforesaid.

"I am, &c.,
"(Signed) C. GREVILLE."

"Custom House, London,
"2nd October, 1848."

In a letter addressed by Mr. Robert Hardey, the Medical Superintendent of Quarantine at Hull, to Dr. Sutherland, dated Hull, Oct. 4, 1848, the following passage occurs:—

"I yesterday received a message from the Collector of Customs to wait on him. When I did so he read to me a document received from the Council Office, having reference to the request conveyed to them (the Council), in a joint letter from yourself and Mr. Grainger, that I should inspect all ships arriving from cholera ports.

"This document I was permitted to copy, and I send you the enclosed. On reading it to me, I pointed out to the Collector the dubious terms of the letter, *i. e.*, they *allow* me to visit, &c., but they do not *order* or *direct* me to do it, terms commonly adopted in such cases; consequently throwing a doubt as to who the parties are who are to pay the Quarantine officer for such duties, which would occupy several hours daily. The Collector fully admitted the terms of the letter were very ambiguous, advised me to write to yourself on the subject, and to have your judgment as to whether I am to consider this letter as an order or mere *permission*, and if the former, whether it will be right to visit all vessels from such ports, when the captain swears, in his affidavit, that he and all his crew are now in good health (and which affidavit admits the vessel into port in a few hours, when medical advice might be had immediately, if *necessary*); or ought the order to be restricted to those cases in which it is reported, by the Inspector of Vessels, that there is sickness on board. There are at present, or have been very recently, cases of sickness on board; and I was directed further to ask you by whom you considered all such services ought to be paid, and to communicate to him your reply.

"I the more readily do this, as, the last evening, Captain Joliffe, of the steam-tug 'Lion,' which took us down to the 'Cato,' the other night, on presenting his bill at the Customs, was refused payment, and ordered back to yourself for liquidation of his debt; from which, as well as an intimation given me yesterday by the Collector, the Custom House authorities evidently repudiate all expenses incurred by your direction till they receive a special order to liquidate the same.

"Yours, truly,
"ROBERT HARDEY."

The Board would submit that, in a case of so much urgency as the one in question, it is not sufficient that the Medical Superintendent should be allowed to visit vessels in Quarantine, but that the case requires that it should be enjoined as a duty upon him, or upon some other medical officer, to visit and afford all possible assistance to the helpless persons on board.

Experience having shown that in the great majority of cases there is a distinct premonitory warning of an attack of this disease, and that if the proper treatment be applied in the first stage, its further progress may in general be arrested, it appears to the Board that every such vessel should be visited, and the persons on board examined at least once daily; and moreover, that every practicable facility should be afforded to the crews and passengers to communicate with such medical officers when the first symptom of disease arises. It appears to be very unsatisfactory that the medical officer should be in any doubt as to his duty, or as to his remuneration.

From information received from Mr. Hardey, it appears that he has held the office of Medical Superintendent of the river Humber since 1841. He states that he has no recollection of receiving either printed or written instructions from the authorities of the Customs respecting the duties appertaining to his office; was informed verbally, when he was appointed, that he was to hold himself in readiness to visit all vessels in Quarantine to which he should be summoned by the master of Her Majesty's revenue cutter, as Acting Superintendent of Quarantine. Lately a River Inspector has been appointed who performs that duty. Does not consider that at present his duties are defined with sufficient clearness.

For instance, if a vessel, with cases of cholera on board, were to arrive and be placed in Quarantine, and witness was requested to visit the ship, he should not know whether he had authority to board her and examine the patients, or whether he was restricted to obtaining information alongside. His experience of cholera, on its outbreak in Hull, in 1832, was extensive, and knowing the great importance of early, prompt, and efficient treatment, thinks he ought to be provided with authority to personally inspect and prescribe for all such cases as those referred to, as in the absence of such aid fatal results might follow. He further wishes to state, that occasionally questions of importance, and of a purely medical character, are decided by non-professional officers. As instances of this, he would state that a short time since a man on board the "Lion" steamer, (the vessel arrived from Hull, on the 13th of September, after a voyage of 48 hours from Hamburgh,) died on the passage, and, as there is every reason to believe, from cholera; the body and clothes were thrown overboard. Of these circumstances witness received no official information.

Another case is that of the English ship "Cato;" this vessel arrived on Thursday, September 28, in the Humber, from Cronstadt, which port she left on the 20th September, the captain died. Of this circumstance witness received no official information, till his notice was called to it by Dr. Sutherland and Mr. Grainger.

Mr. Burt being asked, "Would this special case be met by having the Quarantine in cholera cases performed nearer the port?" he answers, "It would." "What would be the most convenient locality to perform the Quarantine in cholera, so that the appearance of promonitory symptoms among the crew and passengers might be speedily brought under medical treatment? —The lower part of Hull Roads, about a mile from the town though, in that case, a separate Quarantine establishment would be necessary."

Mr. Hardey states:—"There are two ways in which the desired relief might be given. If the Customs authorities determine that the present Quarantine station must be maintained inviolate, then ought they to issue an order that the Medical Quarantine Officer, either in his own person or assistant, should visit this station daily to make all suitable inquiries as to the health of the various crews and passengers, for which purpose a small steamer ought to be placed at his disposal; and further, should the cholera be present on the station, then he or his assistant should remain there till the parties are either dead or convalescent. For this purpose he might be accommodated on board the Quarantine hulk, which possesses all the needful conveniences. This, it strikes me, is the most feasible way of meeting the difficulties of the case, and offering some sort of guarantee to the prisoners in Quarantine that their health and lives shall not be heedlessly trifled with. Or,

"2ndly. The whole of the Quarantine fleet might be permitted to occupy a station about one mile eastward in the Hull Roads, where all signals would be immediately recognised and attended to by the proper parties on shore, and I could very early be on board.

"If neither of these plans are adopted, or some other equally suited to the case, I feel assured we shall have to lament the loss of other lives, which under more suitable circumstances might be spared to society and their friends. As I stated in my last, the two cases of Asiatic cholera to which I have been summoned on board these Quarantine steamers have both been found in collapse when visited; whereas had they been at hand and early attended, they might probably have been relieved. The 'Rob Roy' on Sunday had to break her Quarantine ground, and steam to Hull Roads for assistance, but it was too late. She went down again after the death, and as I have heard nothing from her, I hope all continue well on board."

The Board of Health would call the attention of their Lordships to the anxiety and distress which would probably be excited in some of the passengers, on finding that this vessel had in vain broken her Quarantine to obtain assistance, and that she had returned to the spot in which they had already experienced that all relief was hopeless.

The General Board of Health would beg their Lordships to consider, whether any evidence can be adduced to show that the public safety requires that a vessel in Quarantine should be placed at the distance of eight, four, or even one mile from a port.

The Board is acquainted with no facts which afford grounds for such a decision; but it is understood that in Egypt, Turkey, Malta, and other countries, they are satisfied with enforcing Quarantine at small distances from ships and houses.

The Board of Health would call their Lordships' attention to an additional evil of no small magnitude, in the condition of persons placed in Quarantine; namely, that they are excluded from the possibility of taking the most effectual means of precaution against disease, which the Board of Health have laboured to show consist in the dispersion of the population, and the prevention by all practicable means of over-crowding; but the first operation of Quarantine Regulations is to place persons, presumed by their very position to be highly predisposed to disease, if not the actual subjects of it, in close confinement; and that under the most unfavourable circumstances, usually in a bad ship, in a bad locality, and with all the depressing emotions excited in the highest degree: in Stangate Creek, for example, which is in the Hoo Union, one of the districts the most severely visited by epidemic diseases in the county, and where the mortality of the ordinary population is about the highest in Kent.

On the influence of this locality on health, and its obvious tendency to predispose to disease, Mr. Bowie gives the following evidence:—

"On visiting the guard-ship at Stangate Creek," he says, "I was informed by the officer in command that the principal medicine used by them is quinine, ague being a frequent disease on board; that he himself (the officer) had suffered from ague a few months before, and that it was the common disease of the ship. The medical officer of the hospital ship, moored near the guard-ship, gave me a similar account, and told me that the principal disease on board that ship also was ague. Intermittent fever must indeed necessarily be the common disease of that country, which consists of marshes intersected with ditches. The banks of the creek are exceedingly muddy, so that the vessels appear to be moored in a ditch. I was informed by the surgeon of the hospital ship, that his orders were positive and strict not to go on board any vessel in which there was a case of cholera; that he could not therefore, on any consideration, go on board such vessel; and that before he received these positive orders, if on going on board a vessel he found a suspicious case of any description, he immediately hoisted his yellow flag, thereby putting his own vessel under Quarantine.

"I do not believe," continues Mr. Bowie, "that the system of Quarantine, as lately practised at Stangate Creek, afforded any protection to the country; on the contrary, I am firmly of opinion it inflicted much suffering to the sick, if not loss of life, and was more apt to foster and increase disease than to prevent it.

"When cholera prevailed in this country before, it is well known that while vessels were detained at Stangate Creek or other Quarantine stations, medical men, nurses, and the families of those affected with cholera were allowed to go at large; and that while a passenger by a ship would be detained if from an infected port, he might travel in any way he pleased on land. If there could be any method better calculated to prevent an individual resisting epidemic influence than another, it was to alarm him by entertaining suspicions of his safety, and placing him under the combined depressing effects of having nothing to do, and exposed to the unhealthy atmosphere of a small and by no means clean forecastle of a vessel; surrounded, as at Stangate Creek, by a bare, dreary, swampy country, and floating on a river abounding in mud.

"Captain Miller, of the 'Felicity' of Limerick, on board of which vessel cholera first appeared in London, gives the following account of his experience of Quarantine efficiency in February, 1832, and it does not seem to differ much from what I learned a few weeks ago was then the practice:—

"On Tuesday the 8th, Captain Miller's mate having died of cholera on board the 'Felicity,' was put in Quarantine between the tiers in the river; and on Wednesday, the 9th, about 2 or 3 o'clock, sent down to Stangate Creek, and reached it about 1 o'clock on Thursday morning.

"At 7 o'clock the body was sent on board the hospital ship 'Buffalo,' the 'Felicity' having been placed within 100 yards of a ship the 'Goshawk,' of Newcastle, on board of which two men had died of cholera."

"Captain Miller says, 'I was once on board the hospital ship between decks, and thought her more like a convict ship than an hospital ship. Men taken ill of cholera are not removed on board the hospital ship unless the captain gives security that all the expenses, whether of medicines or provisions, shall be paid; without this the sick men are allowed to die on board of their own ship. I asked repeatedly of what disease the mate had died, but the doctor put it off with a laugh, and refused to give me any information. A lieutenant told me they could not tell, the returns not having come from London. The doctor used to come to the side of my ship in a boat, and look at the tongues of the crew at a distance.

" 'For my own part, it is my decided conviction that there is far more danger of malignant diseases breaking out on board of shipping from the filthiness of the vessels themselves, want of ventilation, and being moored in unhealthy localities, than will ever arise from importation.' "

The following letter has been received from the Vice-Chairman of the General Steam Navigation Company, who urgently pressed representations on the Board, and with whom the Board has had, as the representative of a large shipping interest, much verbal communication on the subject of Quarantine:—

" Broad-street Buildings,
November 6, 1848.

" Dear Sir,

" Referring to the conversation had with reference to the Quarantine Regulations, to which ships coming from Hamburgh have been subjected on their arrival in England, I beg to state that on my arrival at Hamburgh on the 12th of October last, when returning from Schleswick, and with the intention of proceeding from that place direct to London the following night by the mail steamer, I learned that intelligence had reached Hamburgh that on the 6th October an order in London had been issued—' that all ships coming from Hamburgh were to perform Quarantine for six days, to be reckoned from the time of departure; but were also in case of any illness being on board, or which came while laying in Quarantine, to remain so, not only until the party or parties were convalescent, but for six days more after such convalescence,' therefore making the Quarantine almost for an indefinite period.

" On inquiring whether such an order had been issued, as it would very seriously impede the usual commercial intercourse, I found that such was really the case, and I found also that the same had created the greatest astonishment and surprise among officials, merchants, and captains; because, as they very justly said, that the cholera was in England, even in London; and the regulations as regards passengers were completely useless and vexatious, as those from Hamburgh who had occasion to proceed to England were not compelled to go by sea, but had other routes open to them, the land route by Holland, as also the route by Belgium and France, and either of which would of course be taken by them, not being subject to any Quarantine, nor suffering any inconvenience excepting that the journey would be much more troublesome, be 24 to 36 hours longer, and more expensive, but which was to be preferred to the annoyance of performing Quarantine on board a ship, moored within sight of land and surrounded by water and fogs sufficient to give those on board the ague, if not a worse disease.

" In order, therefore, to avoid all this, I, as well as several other individuals, proceeded by land through Hanover, Prussia, and Belgium to Ostend.

" I have also inquired of some of the captains of the Hamburgh mail steamers, who have during the period the Quarantine Regulations were lately enforced, whether any instructions had been received by them how to act, in case any serious case of illness or cholera had occurred while laying in Quarantine, and if no instructions had been given, how they would have acted in case of such an occurrence either happening in the day or by night? It was admitted that in regard to such an occurrence they had been without instructions, and added, that if unfortunately such an occurrence had taken place, they would have hardly known how to have proceeded, as no communication with the shore was allowed; perhaps in the first instance they would have probably administered a dose of cholera medicine which they have on board, and then have made a signal in the hope that the authorities would come to the ship; a person, therefore, before any assistance could come might be dead, or in such a state that there would be no hope of recovery.

" I believe I may, in conclusion, safely say, that withdrawing this useless regulation has given universal satisfaction, at least among mercantile and seafaring men, not because the one is thereby relieved from an inconvenience in travelling, or the other from imprisonment, but really on account of its utter inutility.

" I am, dear Sir,
" Your obedient servant,
" W. J. de Buck."

" John Wilkin, Esq.

From these statements (and many similar representations have been made to the Board) it appears that even assuming the doctrine of contagion to be true, Quarantine Regulations are calculated to defeat their own object; for neglect, inconvenience, delay, expense, and loss, all operate as so much bounty on misrepresentation, false swearing, and evasion, so easily practised in all the modes exemplified in the preceding letter.

With the views which the General Board of Health have already expressed, and in which they are more fully confirmed by constant experience, it is probable that the general question of Quarantine will be again pressed upon them. They would, therefore, beg to impress the whole bearings of the subject upon their Lordships' attention; and, among other documents of authority, they would recommend to their notice the Report of the Royal Academy of Medicine of France, with the facts as published by Dr. Gavin Millroy. Unless any sufficient countervailing facts can be adduced, the Board would be inclined to submit that the continuance of Quarantine at all would appear to be a more than useless waste of public money, in the maintenance of inefficacious and injurious establishments.

The only theoretical ground on which the precaution of Quarantine can be considered necessary or justifiable with reference to any disease is, that it is of a contagious nature; but in respect to cholera, the Board of Health would call their Lordships' attention to the great change of opinion which a more intimate acquaintance with that disease has effected in the professional and proportionately in the public mind of all countries Oriental and European. The opinion that Asiatic cholera is contagious, though at no distant period universally taught in medical schools and colleges, does not indeed appear to have been long retained by any medical man who had much opportunity of observing the disease in India; but when it first broke out in Europe the belief in its contagious nature was very general. It is now abandoned, with a few individual exceptions, by the whole body of medical men in Russia, Poland, Prussia, Holland, and France. Such was the view formerly entertained in our own country of its highly contagious nature, that the first advice given to the Privy Council by the College of Physicians of London, in 1831, was to take the most effectual means for the immediate separation of the sick from the healthy, and in order to accomplish this object, "it would be very expedient," they say, "that one or more houses should be kept in view in each town or its neighbourhood, as places to which every case of the disease, as soon as detected, might be removed, provided the family of the affected person consent to such removal; and in case of refusal, a conspicuous mark 'Sick' should be placed in front of the house, to warn persons that it is in Quarantine; and even when persons with the disease shall have been removed, and the house shall have been purified, the word 'Caution' should be substituted as denoting suspicion of the disease; and the inhabitants of such house should not be at liberty to move out or communicate with other persons, until by authority of the Local Board the mark shall have been removed."

In the resolutions, bearing date the 28th October, 1848, the same College of Physicians say that "Cholera appears to have been very rarely communicated by personal intercourse, and that all attempts to stay its progress by Cordons or Quarantine have failed."

Upon the whole, then, after the publication of the evidence contained in the Reports of the Sanitary Commissioners, which has now been before the public nearly a year, which has not been controverted, and in opposition to which no countervailing evidence has been presented, the General Board of Health would submit whether the inconvenience, expense, suffering, and probable loss of life involved in Quarantine, are likely to be compensated by any amount of public benefit which Quarantine Regulations can be supposed to be capable of effecting.

The General Board of Health would further submit for their Lordships' consideration, that on the decision to which their Lordships may come in this whole matter will mainly depend the opinion formed, and the course pursued by other countries.

To the Clerk of the Council in Waiting.

2.—*Report by Dr. Arnott on the Principles of Ship Ventilation, and on a plan of Ship Ventilation by means of the Pump.*

It is only since the discoveries of Cavendish, Priestley, Black, and others, made towards the end of the last century, that even educated men have known that the air which we breathe consists of material parts or elements as truly as the water which we drink, or the food which we eat; indeed, that it consists altogether of oxygen and nitrogen, the first of these forming also seven-eighths of the substance of water, and the second forming about one-fifth of the substance of flesh; and then, that other substances added to atmospheric air may render it deleterious or poisonous as certain substances added to drink or food damage them; and, lastly, that air which has just served as breath issues from the lungs so changed in composition as to be a deadly poison to the same or to any other individual who should then continue for a short time to breathe it unmixed. The additional substance which the air receives in the lungs is carbon, a part of the digested food thrown off from the blood circulating in the lungs. Certain other combinations of the elements contained in the substances used by man as aliment, some, for instance, of those formed during the changes called rotting or putrefaction, rise into the air as miasms, and prove similarly deleterious.

To render the memory of these truths so vivid as to be a practical safeguard through life, every person should for himself or herself perform the striking experiment of instantly extinguishing the flame of a candle by the poison of the fresh breath. A candle is seen to burn beautifully in the pure air of an inverted glass funnel or of a common lamp glass; but if after this any healthy person take the glass, and before replacing it breathe into it from above so as to fill it with air from the lungs, no sooner is the glass so filled brought to surround the burning wick, than the flame vanishes as if it were choked by a common extinguisher. If instead of the burning candle, a bird or mouse were placed in the breath-air, it would as immediately die. Then it is the fact, that a burning candle in a room changes the state of the air exactly as a breathing animal does, and one large candle vitiates about as much air as a man.

Before knowledge of this kind was gained, even the best informed men had no true notion of the necessity for ventilation, that is, of an art which, when men pass from the open air and wind to inclosed places, should renew constantly the air around them, substituting pure fresh air for that loaded with the excrementitious matters proceeding from the lungs and skin. Serious lessening of human well-being has always gone on wherever this ignorance prevailed. The epidemic diseases or pestilences which at various times have ravaged the earth, are now known, many of them to have been caused, and all to have been perpetuated and propagated, only because aerial poisons were allowed to lurk and accumulate in ill-ventilated places; and the typhoid and other fevers which still infest certain localities are known to have the same origin. In the year 1665 a plague in London swept away more than 70,000 people, or about a sixth of the population, and similar visitations had recurred at intervals of from twelve to twenty years for a long time before, as was true also in respect to the other great cities of Europe; but the great fire of London followed this great plague, and burned down a great part of the close courts and narrow streets where aerial poisons could lurk. These unwholesome parts were soon replaced by wider and better drained thoroughfares, and from that time until the occurrence of cholera in 1832, an interval of 166 years, there had been no plague; but that cholera, which then, instead of destroying a sixth or more of the inhabitants, as it did in many other towns of Europe, caused only one death for about every 250 inhabitants.

The reasons why the true causes of epidemics and kindred disasters were so long concealed from even the better informed of the population, as they are still unknown to the great mass of the public in most parts of the world, and, therefore, why effectual preventive means have been so much neglected, are chiefly the following:—

1st. Men had no clear idea of the material nature of air. A person looking into a box or room in which there was nothing visible, called it empty, and believed that it was completely so; yet if the box or room had been lined with a great open-mouthed bag of caoutchouc cloth of sufficient strength, and the mouth of the bag had then been firmly closed upon the supposed nothing, but the real air within it, a great air pillow would have been formed capable of supporting a corresponding weight.

2ndly. Aerial poison is not visible to us, and often not perceivable by any of our senses.

3rd. As no physical explanation, satisfactory to the intelligence of the time, was obtainable of the origin of epidemic diseases, they were generally referred, like other phenomena not understood, to an ordinance of the Creator, and were called dispensations or judgments of Providence, like death itself, which comes with advanced years or the changes of season, which no man can ward off. Persons with this view might endeavour to mitigate such an evil when it came, but might doubt of the propriety of making stout endeavours to prevent it.

At last, however, about a century ago, when ship fevers were making unusual havoc among our English sailors, both in the fleets at Spithead and on the coasts of Spanish America, and before anything of the true chemistry of air and respiration was yet discovered, some able men, as Dr. Desaguilliers, the Rev. Dr. Hales, and others, raised their voices loudly on the subject of ventilation, and with considerable effect. Dr. Hales argued that, as the Great Author of Nature had allotted nearly one-half of the trunk of man's body for the office of respiration,—in other words, for ventilating the blood passing through the lungs, by constantly renewed quantities of pure air admitted to it; and would, no doubt, if he had formed an animal as large as a ship, have given it a lung apparatus proportionably large; then to see houses and ships constructed, in which multitudes of men were to assemble without provision for change of air, and therefore with total disregard of the manifest purpose of man's anatomical structure, was shocking to common sense. A close house or ship, he might have added, or a mine, may shut out the needful fresh air from the lungs of persons as effectually as a tight rope placed round the neck; and if a man can effect a single murder by the rope, he may do manifold murders by the other means. Dr. Hales advised, as the breathing chest, expanding to admit air, and contracting to expel it, is imitated closely by a common bellows, that large breathing bellows should be fitted to houses and ships. Accordingly large air movers or pumps, of bellows form, were made under the direction of Dr. Hales, and placed in ships and elsewhere, with great evident advantage. Had they been free from a fault in the valves used in them, which occasioned a great waste of labour in working them, they would, probably, have been at once universally adopted and continued; but the fault referred to gave the opportunity to some old naval men, then in office, who disliked novelty and did not understand the subject, to represent that the advantages of the pump were not a compensation for the great labour required to work them. The contrivance in consequence gradually fell into disuse. Dr. Hales asked earnestly, as the men never begrudged their labour at the water pumps to save the ship from sinking and themselves from drowning, why should they begrudge labour at the ventilating pump, which was to save themselves and comrades from death in another form? His expostulation was in vain.

Substitutes for the pumps of Desaguilliers and Hales were afterwards tried, such as the fan wheel, screw propeller, and great chimney shafts, drawing air from the tops of the places of assembly, all of which are good, and, where nothing better can be had, invaluable; but these also being expensive at first to make, and afterwards to work, have not come into general use. Simpler and cheaper contrivances, therefore, had yet to be sought. Matters were in this state some years ago, when my attention was recalled to the subject of ventilation, in which I had had considerable experience at an early period of my life on ship-board, in a voyage to India, during which I had the care of a numerous crew and troops. I then devised the ventilating pump, with curtain valves, as now used here at the Hospital for Consumption, the great Marine Barrack at Woolwich, and elsewhere; the balanced ventilating chimney valve for rooms, already in extensive use over the kingdom, and other means described in my work on "Warming and Ventilating." A new edition of this work, with ample details, will soon appear. I shall here, however, give a short description of the air-pump which was used in the ship "Anson," of seventy-four guns, which in 1844 carried 500 convicts to Van Diemen's Land, and all of whom, and a numerous crew, with the exception of one man who died of chronic epilepsy, arrived there in remarkable health. One such pump in the steerage of the steam-ship coming from Ireland to Liverpool on the 2nd of December last, in which seventy-three persons were suffocated, would have prevented the catastrophe.

The fatal defect or fault in Dr. Hale's air-pump was, as above stated, in the nature of the valves. These, if made large, were so heavy as to be worked with great expense of labour; if made small, they contracted the air-passages, so as in another way to cause an equal waste of power; valves of a middle size, which he ultimately adopted, avoiding, as he believed, as far as possible, both of the evils which he had to contend with, still wasted from sixty to eighty times as much labour as if there had been no valvular obstruction. In the new pump which I have devised, both evils are entirely avoided by the substitution of what I have called the curtain valve, in place of Dr. Hales's solid wooden or metallic valves. This consists of a curtain of oiled silk or cloth of close texture, hanging against a grating or network of wire, fixed across the opening, however wide. If the pump be very large, the curtain has to be formed of several pieces, which overlap one another at their lower edges like the slates of a roof or the scales of a fish. There is no limit to the size of such a valve, and the curtain has no sensible weight. Twenty cubic feet of air, weighing about one pound and a half, is as easily moved through this as the same weight of wood floating in a pond can be moved along by a stick. Proof has been had, that the moderate labour of one man can with this supply breathing air for a thousand people and more.

There are two forms of the pump, adapted to different circumstances, They are called the *barrel and piston pump,* and the *swing flap or pendulum pump.*

Fig. 1 shows the section of the first of these. A B C D is the barrel or case, closed on all sides, except where the valves are, and where the piston rod passes upwards: F E is the piston made loose, but closely fitting, to move up and down in the barrel with the least possible friction; M L D B is the conduit or channel by which the air is forced along from the barrel to escape upwards near M. The piston moves in the barrel only between the limits G H and I K, the remainder of the barrel above and below being to allow the easy entrance and exit of the air by the curtain valves, which occupy the sides of these portions. When the piston descends, the air is driven out from the barrel at the valves K D, as shown by the arrows, into the air duct, and at the same time new air enters at the valves A G, to follow the piston and fill the upper part of the barrel. When the motion of the piston is reversed, corresponding changed motions of the air take place through the valves I C, into the pump, and the valves B H, out of it. This pump is evidently a forcing pump on one side, and a drawing or sucking pump on the other. It may be worked by a lever handle and sling, like a common water pump, or by a crank and fly-wheel, or in other ways. A pump with a barrel of three feet square and three feet stroke of the piston, delivers easily 1000 cubic feet per minute. This is the ample allowance of four cubic feet per minute for every one of 250 persons.

Fig. 1.

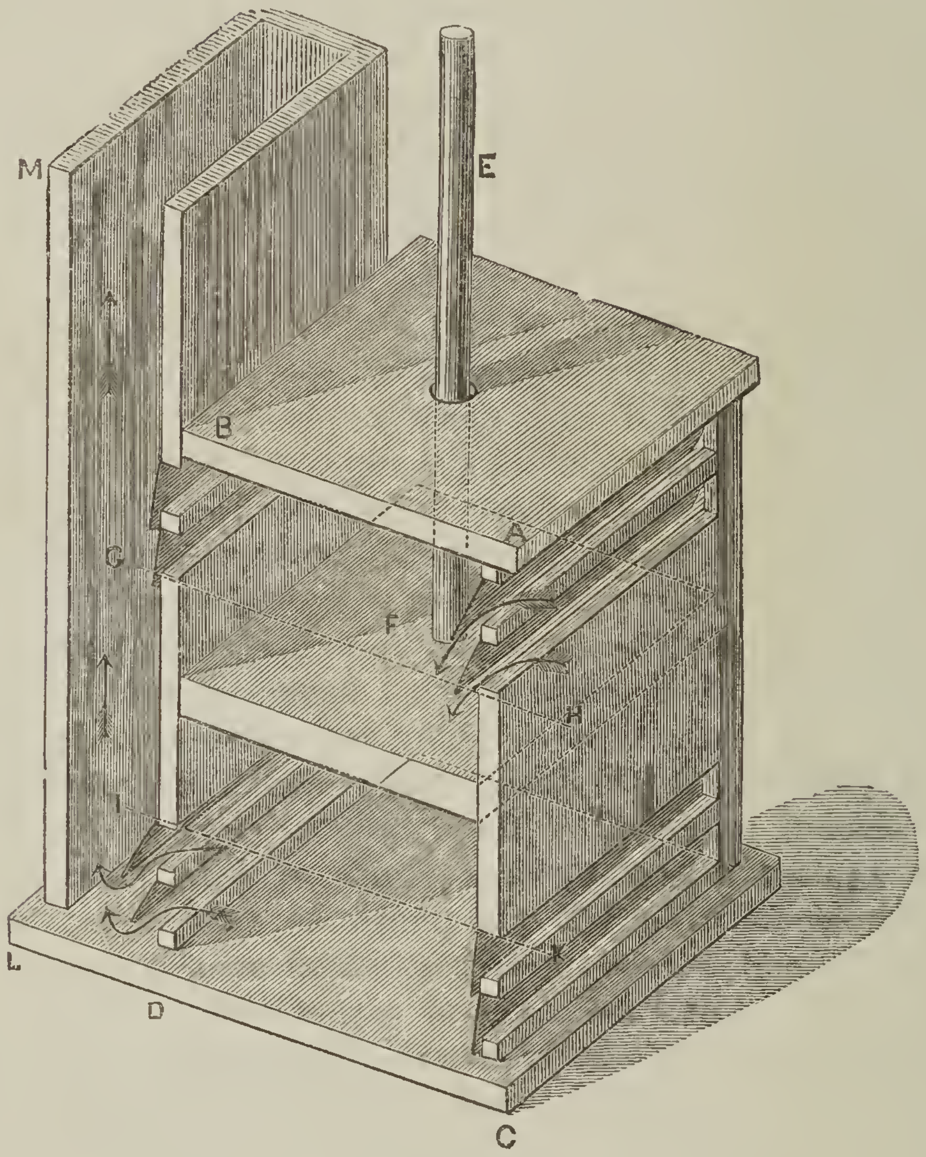
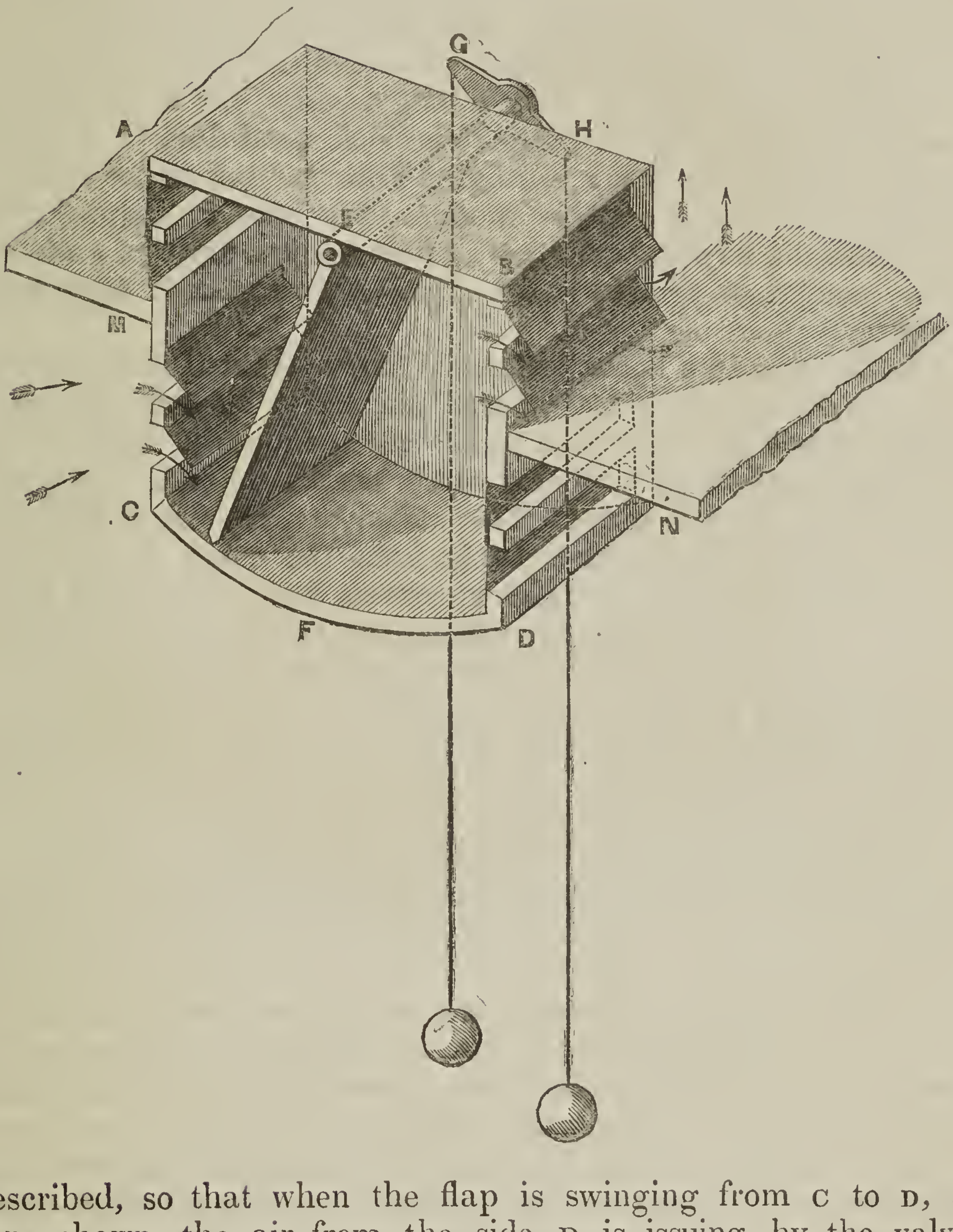


Fig. 2 exhibits a section of the swing flap, or pendulum pump. A B C D is a square cornered or cubical box, which a flap, or partition, hanging when at rest from E towards F, divides into two equal parts. The flap hangs by hinges, or on an axis at E, so that it may swing like a pendulum from C to D; and being made to fit the box to within a twentieth of an inch all round (the bottom of the box from C to D being concave to correspond with the sweep of the pendulum), it drives the air before it as a piston in a barrel does. In the two sides of the box A C and B D, large spaces above and below are occupied by wire grating, against which curtain valves hang as in the barrel pump already

Fig. 2.



described, so that when the flap is swinging from C to D, as here shown, the air from the side D is issuing by the valves between B and N, and air is entering at the side C A by the valves between M and C. During the return swing, the valves just mentioned are closed, and the corresponding ones near D and near A are opened. Each swing of the pendulum discharges half of the air that was contained in the box. This form of pump, like the other, is equally a forcing and a drawing pump, and acts as the one or the other, according as the air-channels are connected with upper or lower valves. If placed with its lower half projecting through a ceiling, so as to appear like a bird-cage suspended there, while the upper half is above in a loft or garret, the action of the pump takes away the impure air from near the top of the room, and discharges it into the loft at once. But by fit tubes connected with the pump, the air may be taken from any distance around, or sent to any distance. The pump is worked conveniently by a handle or cross-piece, G H, connected with the end of the axis of the flap, and either by applying the hand directly, or by pulling from below at ropes G K and H, tied to the extremities of the handle, as in tolling a bell. The fittest speed of motion is that which belongs to a clock pendulum of the same length; the length being estimated from the axis to the centre of oscillation. When quicker motion than this is required, the bottom of the flap should come against springs fixed on each side near C and D, to prevent hard striking, and that it may recoil quickly.

As no room in a house is deemed fitly ventilated which has not an open chimney in it for outlet of air, and at least chinks around door and windows for inlet, so no cabin or place to harbour men in a ship can be well ventilated which has not channels to the open air corresponding to these. The complete provision is where two separate air-channels or tubes exist from the cabin to above the deck, such as are now common in convict ships; one being for the exit of foul air from near the ceiling, and the other for the entrace of fresh air to near the door. A single tube of fit size divided by a longitudinal partition into two channels, is a convenient form. These may be formed in the sides of the ship, as chimney-flues are in the walls of houses; or they may pierce directly through the deck or decks in convenient situations. At the tops of the tubes there must be flaps to close by the impulse or pressure of the water, if waves in a storm should wash over the deck. A bell-mouth opening towards the wind on the top of one of these tubes, and away from the wind on the other, would insure a certain amount of ventilation whenever the wind were blowing, or the ship had motion through the air; and in the absence of this moving power, one of the air-pumps above described should be at hand to insure the desired amount of ventilation under any circumstances.

In ventilating sleeping berths and other places it is often of importance to distribute in some particular way the air which enters, or to take away the impure air, not from one point only of the room, but from many points. In such cases, the pure air from the pump may pass along a branching tube, with openings where wanted; a fit tube in some cases being one of canvass cloth only, and the foul air may similarly be taken away by a pump drawing through a tube of any rigid material, pierced by the needful absorbing openings. In some cases the ordinary hatchways in a ship may serve as one of the two passages above spoken of; and in a ship where no other passage can be obtained, the hatchway may be made to serve for both entrance and exit of air by having in it a tube from the ventilating pump for one current, while the contrary current takes place around the tube.

Part of the business of a good government being to guard the public against threatened dangers, there already exist in this country many admirable regulations bearing on the public health, such as laws regarding damaged or adulterated food, water supplies, construction of sewers, various nuisances, danger from fire, and a hundred other things. Now, assuredly, no one of these objects can be compared in importance with the insuring everywhere what costs so little, a sufficient supply of the prime necessary of life—the pure air of heaven. That the people themselves have been so little aware of the importance of this is, perhaps, the chief reason why so little has hitherto been attempted in regard to it; but the time for action seems now to be come.

The deaths on the 2nd instant from want of fresh air or ventilation, of seventy-three passengers in a ship coming only from Ireland to Liverpool, has excited in persons here of all classes and degrees of information but one feeling of surprise and horror, and they are eager to know what regulations Government will establish to render such a catastrophe for the future impossible. But even this awful event appears to individuals who have been watching such subjects for a time less deplorable, and the fate of the sufferers less severe, than the more lingering deaths of at least forty times as many emigrants who last year sailed from this country to America and the British colonies, and who perished by fevers, generated in the ill-ventilated ships which carried them. And, lastly, even that wholesale destruction of the defenceless and confiding emigrants is but a small part of the evil of the same kind which has been going on, almost unnoticed and unsuspected, throughout the community, from the want of judicious regulations from authority with respect to sanitary matters.

15th December, 1848. N. ARNOTT.

3.—*Report made to the Lords of the Admiralty on the successful application of Ventilation by the Pump in the "Anson" Transport.*

[Extract from the Log Book of Dr. Andrew Miller, Surgeon-Superintendent of Her Majesty's Ship "Anson," which conveyed Convicts from England to Van Diemen's Land, between July, 1843, and February, 1844.]

In the preservation of the health of the convicts great cleanliness in regard to their persons and clothes was enforced, and the dryness, purity, and ventilation of the prisons was much attended to.

The convicts returned on the sick-list have not been the occupants of one deck more than another.

This is principally to be attributed to the system of ventilation established. This important operation is carried on in this ship by means of air funnels leading from the atmosphere to the orlop, a fan wheel, and by air-pumps. As the latter are new, and from the experience I have had I strongly recommend their adoption, I beg to offer a sketch and brief description.

The idea of the air-mover or ventilating-pump was given to me by Dr. Neil Arnott, of London, one of Her Majesty s physicians, on my mentioning to him what appeared to me to be the great difficulty in the arrangements in this ship, the securing a sufficient ventilation of the orlop deck, in which about 250 prisoners have been confined.

The pumps can be transported from one part of the ship to another as easily as an ordinary box, and can be made by the carpenter, from simple materials found on board every ship, at an expense of about 30*s.* Four pumps are fitted here, so that they can be used to force fresh air from the atmosphere down the air-tubes to the orlop deck, when the vitiated air is pushed upwards through the hatchways (the deck above being protected by a screen) and the second air-tube of the prison, or to expel through the same tubes the vitiated air from the orlop deck to the atmosphere ; in this case the fresh air descends by the hatchways and the second air-tube. In both of the operations the pumps act correspondingly with the wind-sails in the hatchways ; and the bell-mouthed extremities of the air-funnels communicating with the air-tubes, turned from or towards the wind, render them either drawing or forcing machines.

Two boys can with ease work a pump for two hours, and are then fit for any other duty.

The one-fan and fly-wheel ventilating apparatus on board can be worked only for five minutes by three men, when a relay is necessary ; and at the end of half an hour the six men who have been so employed require rest. The amount of effect in forcing the air is very greatly in favour of a single pump, as may be ascertained by any simple test. The pump barrels being two feet square, and the stroke of the piston two feet deep, they consequently throw out eight cubic feet of air at each single stroke. There are four of these pumps, being one for each cell, and as the amount of air in the prisons on the orlop may be estimated at 30,000 cubic feet, while the pumps can be worked at a rate of fifty double strokes per minute, the whole of the air of the prison can be changed in about ten minutes, giving nearly fourteen cubic feet of fresh air per minute for each man.

These pumps would be very useful in giving a current of air for the fires on board steam-vessels, and a variety of other purposes. If the suggestions offered in my letter of the 28th July, 1843, addressed to the Secretary to the Admiralty, had not been adopted for the removing of the boarding along the prison bars, and the introduction of the air-funnels, &c., I believe it would have been impossible to have confined the prisoners on the orlop without most serious injury to their health, but as the arrangements are now completed, I hope I may be allowed to report that the result has been very favourable.

The adoption of the pump gives perfect ventilation, without the occupation of useful space.

[Here follows a description of the barrel and piston pump, with a plan as given above in Dr. Arnott's Report.]

The valves are merely suitable pieces of cloth, hanging like curtains against a network of wire, which network forms nearly the whole of the upper and lower portions of the sides of the barrels.

Thus the passage for the air may be nearly of an area as large as the piston, offering no obstruction, and the loose piston will move the air before it with nearly as little resistance as a common door closes when it is shut or opened.

The pumps on board here are worked with a common handle like what is used in a water pump,

MONTHLY MEDIUM TEMPERATURE of the THERMOMETER at SEA at NOON.

	Atmosphere.	Lower Deck.	Orlop.
1843 October . .	70°	77°	76°
,, November . .	79	82	83
,, December . .	64	73	75
1844 January . .	60	69	70

4.—*Artificial Ventilation on Board Ships.*

ARTIFICIAL ventilation has hitherto been almost exclusively effected by wind-sails on board ships; for, though other methods have been proposed, they have either not answered, or have not yet been sufficiently tested to show their effectiveness. Ventilation by means of wind-sails is defective in many essential points. With strong breezes, in dry weather, a sufficient volume of pure air can be carried by them to, but cannot be sufficiently diffused along, the decks. They can reach only one point of one deck at a time: at that point, the force of the air in fresh breezes is too strong, chilling, and often communicating disease to, the persons on whom it directly falls.* Beyond that point it extends various distances, according to the force of the descending current, but does not extend far in most cases, and is often scarcely felt over considerable spaces between decks. Three wind-sails are generally employed, which are suspended from the rigging, pass down the hatchways, and terminate at any point between decks which may most require ventilation. They vary in size from 18 inches to 3 feet in diameter; and when properly adjusted, so that their open, upper part is exactly opposed to the breeze, they transmit a sufficient supply of air, if it could be equally diffused over the interior of ships: distribution is the difficulty. In some places, as has been stated, where the tubes terminate there is often too much; in others, there is, if any, too little. That is the greatest objection to ventilating by wind-sails. In calms it is of course unavailable, and in rainy weather cannot be practised.

Adequate and equal ventilation between the decks where the people live, and an exhausting power, by which stagnant air may be removed from the holds, wells, and store-rooms, where deleterious gases are likely to accumulate, are therefore decided *desiderata.—Statistical Reports of the Health of the Navy for the years* 1830—6. *Introduction*, p. 20.

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* It sometimes happens that men near the wind-sails, feeling discomfort from the chilling effects of their currents, tie them up during the night, and so, while undetected, which may be during a whole watch, deprive their shipmates of the fresh air which the wind sails might supply, and which is particularly wanted by those at some distance from the hatches. It also sometimes happens that wind-sails, which are taken up during rain, are forgotten to be let down again when it ceases. These, though not necessary, are objections to this method of ventilating.

5.—*Extract from Letter of Robert Rawlinson, Esq., Superintending Inspector of the Board of Health, on the Removal of Bilge-water by the Pump.*

HAVING experienced some sickness at sea from bilge-water, and tried remedies to get rid of the nuisance, which renders vessels not merely ill-drained and moveable cellar dwellings, as they have been properly designated by the Board, but moveable cesspools constantly in motion, I beg to state that, during the time I was engineer to the Bridgewater Trust, the following plan was adopted:—a small pump was fitted up and attached to the engine, which could be connected for work at pleasure: this pump passed into a well formed betwixt the timbers, into which a communication was made fore and aft. A pipe and tap was fixed in the side of the vessel slightly under the water-line, so as to admit at pleasure a supply of fresh sea-water to the bilge; and this was done daily to the extent of effectually diluting any foul water that might have accumulated, and the whole was then pumped out by the engine: by this means the vessels were kept perfectly free from the foul and sickening smell so common in all vessels where bilge-water is allowed to accumulate.

This plan may be adopted in every form of vessel, substituting hand-labour at the pump for the engine in the steamer; and even in the steamer the pump must be arranged so as to be occasionally worked by hand; for instance, at such times as the engine is not in use, when the boat is in dock, taking in cargo, &c.

To do the work at long intervals will not avail, as bilge-water becomes foul very rapidly. The bilge-water alone cannot be pumped out; there must be means, under control, of admitting fresh water to dilute it, and the whole may then be removed by means of the pump at daily intervals; that is, each day the foul water should be diluted, and a portion of it carried out by means of the pump; and if this system were continued with regularity, the bilge-water would be retained as sweet and pure as the external water in which the vessel floats. At present, vessels with foul bilges can only be considered, as just stated, as floating cesspools of the most dangerous kind; because the motion of the vessel keeps the fetid water in constant agitation, and the whole atmosphere between decks is tainted with the vapour and gases given off. There can be little doubt but that most of the nausea and sickness experienced by landsmen on first being confined to a sea-going vessel arises from the vitiated atmosphere consequent upon foul bilge-water.

6.—*Copy of Order made in respect to a threatened outbreak of Cholera on board a Merchant Vessel arriving at Aberdeen.*

To the Parochial Board of the Town of Aberdeen
and to all others whom it may concern.

The regulations in force as respects the prevention of the spread of epidemics amongst the dwellers in houses on shore declared to be applicable to vessels in port.

Whereas by the Act 11th and 12th Victoria, cap. 123, intituled "An Act to renew and amend an Act of the tenth year of Her present Majesty for the more speedy removal of certain nuisances and the prevention of contagious and epidemic diseases;" and by virtue of an Order of Her Majesty's most Honourable Privy Council, bearing date the 27th day of March, 1849, directing that the provisions of the said Act be continued in force throughout the whole of Great Britain, we, the General Board of Health, are authorized to issue such directions and regulations as the said Board shall think fit, for the prevention, as far as possible, or mitigation of epidemic, endemic, and contagious diseases. And whereas we have been informed, that a vessel about to arrive in the port of Aberdeen has had a fatal case of cholera on board, we, the General Board of Health, do hereby order and require that on the arrival of the said vessel, or of any other vessel where cholera or epidemic disease has occurred, or as soon after as may be practicable, the Parochial Board of the town of Aberdeen shall, by themselves or their officers, enter the said vessel or vessels and examine their sanitary condition and inquire into the health of the crews, and, if need be, order cleansing, purification, and all other necessary measures for the prevention of disease, which are authorized to be adopted in any dwellings whose inmates may be affected or threatened with cholera or other epidemic disease.

Given under our hands and under the seal of the General Board of Health, this twenty-third day of April, one thousand eight hundred and forty-nine.

(Signed) Carlisle.
(L. S.) Ashley.
Edwin Chadwick.
T. Southwood Smith.

7.—*Draft Order for Sanitary Regulations proposed to be enforced on Merchant Seamen Vessels for the prevention of the spread of epidemic diseases amongst Passengers and Seamen arriving in port.*

We do hereby order and direct as follows:—

Cases of sickness on board to be notified to the Customs' officer or pilot by captains of vessels on their arrival in port.

I. That in every case when a vessel arrives in port the captain shall report to the Customs officer, (whether inspector or surveyor, who first comes on board,) or to the pilot, the number of persons on board, whether passengers or seamen, who are unwell, and who from illness, from whatsoever cause, are so unwell or depressed, as to be unable to stand or to work.

The Customs' officer or pilot to inquire of persons sick.

II. That the said Customs officer shall see the persons who are unwell and so depressed by illness, and if upon inquiry the illness or depression appear to arise from any other cause than from common sea-sickness, or if the symptoms be such as are described in the instructions hereunto annexed; if there be cold or shivering, followed by heat or sweating, or if the illness, from whatsoever cause, be such that there is reasonable ground for desiring medical advice, or if such advice be desired by the person suffering—

And in other cases of sickness than common cases of sea-sickness to send notice on shore, and require attendance of medical officer or practitioner.

III. Then such officer shall send notice thereof, to the nearest medical officer, or to any medical practitioner, who may have been specially appointed to act as officer of quarantine; or in case of there being no such officer, or in the case of his absence, to any other duly qualified medical practitioner.

Captain to give means of sending notice and bringing on board the medical officer.

IV. That for the purpose of sending such notification the captain shall provide a boat and men, as he may be requested, to convey the notice, and to bring back such medical practitioner to examine the case or cases of sickness on board.

Captain of British ship, on request of persons sick, or at his own instance, to send notice on shore, and to require the attendance of a medical officer or practitioner.

V. And we do further order, that in the event of the occurrence of one or more of such cases of illness, other than cases of common sea-sickness on board, and upon request from any passengers or seamen, or without such request, where there is reasonable ground for believing that there is a case of fever on board, or where more than one person on board is suffering from illness of the like symptoms, other than common sea-sickness, the captain of any British ship shall, himself, forthwith, and without any inquiry by any Customs officer or pilot, send such notice as aforesaid, and procure the attendance of any medical officer or person specially appointed, or in case such persons shall be engaged, he shall send and obtain the attendance on board of any other duly qualified medical practitioner.

Medical officer required to attend and examine the cases of sickness, and treat.

VI. And we do hereby order and direct, that such medical officer, or legally qualified medical practitioner, shall, upon receiving such notification, forthwith go on board the vessel and examine the cases of sickness on board, if they are cases of endemic or epidemic disease, and treat them as provided by the regulations for the treatment of cases of endemic and epidemic disease occuring in dwellings on shore.

In case the medical officer find the ship in a filthy and unwholesome condition, and that there is a dangerous overcrowding and want of ventilation, he may order the sick to be removed and treated on shore, and the ship to be cleansed.

VII. And in case he shall find that the cabin, or hold of the vessel where the sick person lies, is in a filthy condition, and without proper accommodation, or that from the number of persons on board there is danger of the spreading of the disease, or that there is not on board such vessel proper attendance or means for the suitable treatment of the sick, and that the patient may be removed with less danger than if he remain on board; we do further order and direct, that in every such case the medical officer shall take order for providing suitable rooms or premises on shore for the reception of such patients, for their removal thereto, and for their treatment therein.

Regulations for the prevention of the spread of endemic, epidemic, and contagious diseases on shore declared to be applicable, *mutatis mutandis*, to the treatment of such cases on shipboard.

VIII. And we do further order, that in the case of the occurrence on board of such vessel of any case of epidemic, endemic, or contagious disease, or in case of the arrival of the vessel from any port or coast of any country, where it is known that cholera or other epidemic or endemic diseases are prevalent, he shall and is hereby authorized to take measures for the protection of the passengers and crew on board such vessel, and the prevention of the spread of epidemic diseases; and for such purposes he is hereby authorized to proceed in the manner prescribed in the several regulations for the prevention of the spread of epidemic diseases amongst the occupants of dwellings on shore; and all the regulations for the treatment of the cases of premonitory symptoms, for the removal of persons having such symptoms to houses of refuge, shall be applicable to the treatment of persons on board such vessels.

In cases of there being no appointed medical officer, any duly licensed medical practitioner to be applied to and required to act.

IX. And in case of any vessel arriving at any port, or lying in any such port, river, or creek, or near the coast in any part of the United Kingdom, out of the jurisdiction of the Poor Law Amendment Act, and where no medical officers are appointed, then application shall be made by the captain, or any officer in charge, to any duly licensed medical practitioner as may be convenient thereto.

Officers of Customs and pilots to take with them copies of orders and regulations and instructions.

X. And we do hereby order and direct, that all officers of Customs appointed to take charge of vessels on their arrival and every pilot, shall keep and carry with them copies of these our directions, and shall call the attention of the captain of the vessel to these regulations and instructions and information thereon.

Proposed statutary enactment to authorize payment of reasonable charges of medical officers, at the accustomed rate of charge.

[XI. And be it enacted, that for such service the medical officer shall be entitled to charge extra, at the general rate of his allowance, for his services for the Union or place for which he is appointed; and such charges shall be payable, and paid by the captain of the vessel, in behalf of the owners, together with any reasonable expenses for the treatment of the sick. And any medical practitioner, who is not an Union officer, shall be entitled to charges, with extra remuneration on account of distance, at the same rate as those which he is in the habit of receiving from private patients of the class of those attended and treated on shipboard.

Summary jurisdiction of magistrates to determine on reasonableness of expenses.

XII. And in case of dispute, in respect to such charges, such dispute may, where the bill of charges does not exceed twenty pounds, be determined summarily, as in cases of seamen's wages not exceeding twenty pounds, according to the provisions of the Statute 7 and 8 Vict., cap. 112, sec. 15; and any justice before whom complaint is made shall determine summarily as to the amount which is reasonable, according to the accustomed rate of charge within the place and at the distance for attendance to patients of the like class or condition in life.]

8.—*Reports on the Questions of Contagion, &c., in relation to Cholera and Plague, from Consuls and others at Foreign Cities.*

I. Contagion.

1. With reference to Cholera.

Some persons abroad still retain belief in the contagious character of cholera; but the great majority of observers, both in Eastern and in European countries, entertain the opinion expressed in the following extracts:—

Dr. Thompson, of Damascus, through Colonel Rose:—"As regards the question whether cholera is contagious, it is one which will always have professional opinions divided about it; but as an individual who, from my position as quarantine officer for the city of Damascus during the present visitation, had ample opportunities, and availed myself of them, to satisfy my own mind on the subject; and, from mature deliberation, I arrived at the conclusion that cholera is not contagious; and, further, I am satisfied it traverses a country through the agency of electric currents in the atmosphere."

John Barker, Esq., through Sir Stratford Canning:—"The barber of Suedia, named Semäan Haltab, who performed the noted cures of the 70 cholera patients in Suedia and vicinity during the months of July and August last, and who was consequently exposed to the danger of taking the malady while operating on two or three patients per day, has a wife and 13 children and grand-children, who all sleep huddled together on the floor of a house composed of a single apartment. Now, the astounding fact to which I call the attention of the public at Smyrna is, that, although the barber returned home every night after operating on two or three cholera patients in the day, and slept with his wife, and in the midst of his whole family, not one individual caught the cholera!

"Another barber of this place, named Pshara, during the same months of July and August, bled from the arm an equal number of cholera patients (most of whom died) without communicating the disorder to his wife or to any of his four young children, although sleeping every night altogether on the ground in one room."

Colonel Rose:—"Cholera is not, in my opinion, contagious; however, I think that a person breathing the confined air of a filthy place where cholera is fatal is liable to take the disease."

Dr. Wissmann, of Stettin:—"The almost unanimous opinion of all our physicians is, that cholera is not a contagious disease."

Dr. Muller, of Hanover:—"Real contagion is almost universally denied; the infection arises from miasma. Touching those attacked, or remaining for a long time by the diseased or the bodies of those dead of cholera, does not increase the susceptibility of contracting the disease by persons in health."

Dr. N. H. Julius, of Berlin:—"There is no reason for believing the cholera to be contagious; it is rather an endemic disease. The best preservatives are sanitary measures: Quarantine is quite superfluous."

Her Majesty's Consul-General at Christiana, in a Despatch dated January 19, 1849, says:—"The medical men in Norway are, without exception, non-contagionists; but a large proportion of the public and officials still entertain a contrary opinion.

"The professional members of the Board of Health of Christiana were, therefore, highly pleased to receive the copy of the letter addressed by the London Board of Health to your Lordship, relative to the cholera and the inutility of Quarantine regulations in preventing its introduction into the country, and they lost no time in publishing a translation of it in the Norwegian newspapers, in confirmation of the opinion they themselves had arrived at."

In a later Despatch it is added:—"A few days ago the Medical Board of Health of Christiana presented a letter to the Norwegian Council of State, similar in spirit to the one received by your Lordship from the General Board of Health of London, showing the inutility of Quarantine regulations for preventing the introduction of cholera into any country, and suggesting the propriety of a relaxation of the Quarantine laws with respect to that epidemy.

"Although the proposition met with considerable opposal in the Council it was ultimately carried, and submitted to His Majesty for the royal sanction.

"Yesterday's mail brought the proposition back again from Stockholm, but His Majesty has withheld his sanction.

"The Quarantine regulations therefore remain as stringent as ever with respect to this epidemy."

Her Majesty's Consul at Port au Prince:—"It is a remarkable fact that, in 1833, when the cholera was raging in the neighbouring islands, not a single case occurred in Hayti, neither were there any Quarantine restrictions to prevent its introduction."

The experience appears to be the same in America. *Her Majesty's Consul at Mobile* says:—"I take the present opportunity of observing that, when cholera recently prevailed at New Orleans with such deadly effect, it did not assume at this place an epidemic form. Those cases of a malignant character which have appeared here have been imported either from New Orleans, with which there is a daily communication, or from the ships which lay at anchor in the bay some thirty miles distant, or from the steamers which ply upon the neighbouring river, the Alabama. This fact is another proof I would submit to your Lordship of the non-contagious nature of the malady."

2. With reference to Plague.

Observers who have had opportunities of witnessing the origin and progress of plague, both in Egypt and Turkey, state that the evidence of the alleged importation of plague into the localities in which it breaks out, when examined, fails; that there is the strongest reason to believe that its origin is indigenous, and that it does not spread from person to person, but breaks out in districts remote from each other, without any traceable communication between the affected persons. They say it often rages in one city or district, and even in a particular part of a city or district, while, in the immediate neighbourhood, though in constant communication with the diseased locality, no case occurs. It is stated that it has again and again happened that the plague has been most destructive at Alexandria and has not reached Cairo, and that it has been in Cairo without reaching Alexandria; while it has attacked intermediate towns, and spared both these capitals, though there has been a constant active and unchecked transit both of goods and passengers.

Mr. Abbott, one of the surgeons of the Pasha's fleet, gives an instance of plague occurring under his own observation, which could not be traced to communication with infected persons, very similar to the cases which have been described with reference to cholera as breaking out on board the "Justitia" hulk at Woolwich, the "Dreadnought" hospital ship at Greenwich, and among the convicts in the Millbank prison. "In the year 1835," he says, "I was attached to the 'Aboukir,' 80-gun ship, when the plague broke out; she had been in Quarantine six weeks, and no plague had shown itself. The first person attacked was a black, who had been taken on board in the month of June or July; he was a prisoner from Nablous, and embarked at Jaffa, at neither of which places was there any plague; being a prisoner of war, he was not allowed any communication with the shore."

There is a general concurrence in the statement, that the closest contact, and the most intimate intercourse with the sick, does not communicate the disease. That, for example, mothers frequently die of plague without imparting it to their sucking children; husbands and wives have the malady while in a state of habitual cohabitation, without conveying it to their partners; and plague patients often expire in the arms of others without any evil consequence happening to the attendants. *Dr. Pezzoni* says that the nurses and other persons employed in plague establishments appear to be invulnerable to the disease, "since they remain both day and night with plague patients in perfect impunity, dressing their wounds, making their beds, and rendering them every sort of help."

Mr. Abbott says:—"I myself not only touched my patients every quarter of an hour, but obliged my assistants to touch them, and also to sit on their beds, and there to remain until relieved (hourly), to administer the remedies prescribed. Neither I nor my assistants were attacked by the disease. The hospital on board my vessel, 'Aboukir,' was only constructed to hold eight persons, four below and four above, separated only by rails about three inches apart; so that, in reality, four persons were lying in one bed, and yet not one of the many other patients admitted into this hospital during the time (nearly three months) the plague patients were there had the slightest symptoms of the disease. I never adopted any kind of Quarantine or any fumigations. The 'Aboukir' was a line of battle ship of eighty-four guns, and had at that time upwards of 1000 men aboard, suffering under the usually considered predisposing causes. I have known several medical men who, while the plague was raging with its greatest violence, persisted in making post-mortem examinations of plague patients without taking the disease, and yet when the disease had nearly ceased (indeed, after all Quarantine had ceased, and every one in full pratique), they have been attacked and carried off by it. Could it have happened by contact? Is it not more probable it was caught by infection, or the common cause of the disease? Dr. Laidlaw, a practitioner of first-rate abilities, attended many cases of plague during the whole existence of the disease in this country. He established a hospital for the reception of the English, and upon one, a captain of a merchant ship (while labouring under plague), he tied the external iliac artery; the femoral artery having given way, in consequence of the great sloughing of the bubo and surrounding parts. The patient recovered, and Dr. Laidlaw did not take the disease; neither gloves of oiled silk nor any other absurdities were used.—I knew the female servant of Mustapha Capitan, who died of plague while suckling; the child did not take the disease, and is, to the best of my knowledge, now alive. I also knew an instance of a person sleeping with a female all night; she left his home early in the morning, and, upon his going into the street about two hours afterwards, he found her lying within a hundred yards of his house suffering from the plague. Also, the case of Madame Bugily, who, with her husband and family, was in strict Quarantine; she was suddenly taken ill, the medical men attending her were uncertain as to her complaint, but, after a few days, she died of the plague. During all this time her husband was sleeping with her, and attending upon her; neither he nor any one else in the house caught the complaint.

"It is certain that the clothes of plague patients are publicly sold in the bazaar, when the plague has subsided, without the communication of the disease. In the month of February, 1835, in consequence of the existence of the plague in Alexandria, our fleet was ordered to sea. It was necessary that provisions, clothing, and stores of all sorts, blankets, tarbouches, shoes, and other woollen and leathern articles, all supposed to be highly susceptible, should be embarked. Now, these things would have been rendered useless had they passed through the usual ceremony of fumigation; therefore that form was dispensed with, and the articles were received on board direct from the stores on shore, necessarily passing through many hands, and certainly many of the persons charged with their transport and delivery must have had the plague; indeed, it is well known, many died of the disease.

"The day before we sailed, the wives and relatives of the sailors were also permitted to come along-side, when tarbouches, blankets, cloth dresses, and other articles, were received on board, and yet, in spite of the neglect of Quarantine, the plague was not introduced into the fleet."

Dr. Bowring, who, when on a mission from the British Government to the East, had opportunities of learning the opinions of the medical and other intelligent residents with reference to this subject, says:—"Were the opinions consulted of European physicians settled in the Levant, who enjoy the highest character for probity and experience, I believe a majority of them would be found opposed to the current doctrines as to the contagiousness of the plague.

"I found the opinion of Clot Bey, a physician who is at the head of the medical department in Egypt—a man whose services to knowledge and humanity in that country outstrip all meed of praise—wholly opposed to those of the contagionists. He assures me that, in the facts of which he had cognizance, he had found irresistible evidence against the prevalent opinion as to the contagious character of this disease; that, removed from the regions of malaria or miasmata, he had never known the plague to be communicated by contact; that all his attempts to communicate the disease had failed; that he had twice inoculated himself from the pus and the blood of plague patients without receiving the disorder; and the experiments made of wearing the clothes of those who had died of the plague had shown the difficulty, if not the impossibility, of communicating the disease; that he deemed lazarettos and Quarantines not only useless, but pernicious. The body physician of the Pasha of Egypt, Gaetano Bey, entertains similar opinions, and is about to embody them in a publication, which will communicate the results of his many observations; and I mention these gentlemen by name, because they have been able to extend their observations over the widest field, because their testimony is of the highest value, and because their judgment has not been hastily formed, but is the result of the most elaborate inquiry and the most extensive experience, and their judgment is disinterested."

The facts recorded by Dr. Laidlaw are calculated to make a deep impression on all who examine this subject with candour. He had the best opportunities for observation, and he began his inquiries with as " firm a belief in the high degree of contagion which has been universally attributed to plague as any person could have; who had followed implicitly the orthodox principles of the schools in which he received his education." Having resided in Alexandria for a period of seven years, and practising there when (in 1835) the plague raged to an extent almost unheard of even in Egypt, he states that he has paid diligent attention to the most minute circumstances connected with its propagation during that epidemic period, as well as on the occasions when it has occurred sporadically; no year having passed without some cases of plague coming under his observation. He gives the following cases, with a view to show that the contagious nature of plague, even allowing that under certain circumstances it may be propagated by contagion, has been greatly exaggerated, and that, " so far from its following as a general rule that persons exposed to the contact of the affected are always, or generally, attacked, it ought rather to be considered as the exception."

" Case 1.—*Feb.* 7, 1835.—The female servant of Mrs. Hume was attacked with plague. Mrs. Hume's family consisted of only this servant and one lodger; and they were in the strictest Quarantine; no one being allowed to enter or go out of the house, and every article of provisions, which were the only things admitted, was passed through water, and every paper carefully smoked. I was called in to see the patient, and prescribed for her, and she was afterwards removed to the Lazaretto, and got well. Mrs. Hume, the lodger, and myself, were the only persons who were in contact with her, and we all continued in health during the epidemic.

" Case 2.—*Feb.* 18, 1835.—Mr. G. Sceriha was attacked with plague, and I was called in to attend him. This patient died 60 hours after he was first attacked. The whole of his family, consisting of his mother, two brothers, three sisters, and an Arab woman servant, as well as myself, were constantly about the patient, as much in contact with him as in cases of ordinary disease. A few hours before he died I cut all the hair from his head to endeavour to relieve the delirium. The family removed to another dwelling, and no one was attacked at the time; but the elder brother died of the plague about six weeks afterwards during the height of the epidemic. The three sisters, mother, brother, Arab nurse, and myself escaped.

" Case 3.—*Feb.* 24, 1835.—My servant Mohammed was attacked with the plague. I attended him and did everything I could to assist him, and he ultimately recovered. He was in every way in as complete contact with me as possible, making my bed, brushing my clothes, and waiting upon me. During his illness many of his friends came to see him, and showed no hesitation in assisting him in every way. I never could ascertain that any one of these was attacked with the disease; it was certainly not the case with several upon whom I kept my eye during the epidemic. One man, whom I employed, especially to look after the patient during his illness, I found one morning fast asleep with his head reclining upon the bed of the patient, I know that this man did not contract the disease.

"Case 4.—*March* 8, 1835.—The master of the English brig, 'Delight,' in the harbour of Alexandria, was attacked with plague, I was sent for and went on board, and afterwards visited him twice a-day till he recovered: the case was a very severe one, and the patient was delirious before I was called in. I bled him, and treated him precisely as if he had not been suffering from a pestilential disorder. The cabin boy, who attended upon him, slept in the same cabin with him, and not three feet distant from the bed. The mate of the vessel slept in a berth next to the main cabin, and with which there was a constant communication; he frequently assisted the sick man in changing his linen and in arranging his bed-clothes. Upon visiting the patient one day, I found the master of another vessel sitting close to the bed-side; and when he went away he shook hands with him. These three individuals I anxiously watched to see if they would receive the infection, but they all remained in perfect health.

"Case 5.—*March* 24, 1835.—The carpenter of the brig 'Patriot,' lying in the harbour of Alexandria, was attacked with the plague. This patient died on the eleventh day. The vessel in which this case occurred was full of cotton; and a round house had been built on the deck for the accommodation of the seamen. This round-house was only about 14 feet long, by 10 in breadth, and was fitted up all round with berths for the men, one above the other: in this small space the whole crew were crowded, and the ventilation was very imperfect. The crew of the vessel lived and slept in this place five days and nights along with the sick man; and it is impossible to conceive any plan by which they could have been placed more immediately in contact, or by which infection or contagion was afforded a more favourable opportunity of developing itself; yet, of all the persons thus exposed, only one person was afterwards attacked with the disease, and he recovered after a few days' treatment.

"Case 6.—*April* 5, 1835.—The captain of the brig 'Elliott,' in the harbour of Alexandria, was attacked with plague in its most virulent form. [This is the case mentioned by Mr. Abbott.] His ship was loaded with cotton, and he was on the eve of sailing, and taking on board two passengers for England, a man and his wife, who lived in the same cabin with him, and assisted him in every way in their power, until he was brought ashore to the hospital, a period of several days. I attended him, and he got gradually better. On the 15th May, the sloughing of the plague bubo in the groin opened the femoral artery; and, to prevent his bleeding to death, I was obliged to tie the external iliac artery, and he ultimately recovered. The passengers, his mate, several of his seamen and his cabin boy, the latter sleeping in the same room with him during his illness, were of course as much exposed as could well be, yet no one became sick.

"Case 7.—A young lad in my own house was attacked with plague, and died in a few days. My family consisted of a gentleman who resided with me, a European man and his wife, as servants, and the lad. The two servants concealed from me the circumstance of the boy's illness till he became insensible, in the hope that he would recover. No precautions were taken, and the servants who slept in the same room with the boy were in constant communication with myself and my friend; no one was attacked.

"Case 8.—*April* 6, 1835.—Sceriha, the brother of the patient, Case 2, was attacked with plague, and died in five days. I did not see this patient till the third day. His mother, brother, three sisters, and myself, with several other persons, were constantly about the patient and in contact with him: no one was attacked, and they are all now alive and well. I am aware that to this case it may be objected, that he had contracted the disease from his brother; but if the credulity of any objector is so great as to lead him to believe that this person could walk about, eat and drink, and be apparently in the most robust health for no less a period than 47 days, and at the same time be labouring under the infection of plague, I am willing to waive the case as an argument; and, indeed, I have only selected it for the purpose of showing how a number of persons may be exposed more than once without the disease appearing among them.

Case 7.—*April* 7, 1835.—The plague broke out at the house of Mr. T——, a merchant of Alexandria, and I was sent for to attend the patients. I found three persons attacked all on the same morning, a gentleman residing with Mr. T——, an Italian servant, and an Arab servant. The two servants were removed to the hospital; the other patient remained in the house, and was attended to and assisted by myself, Dr. Aubert, Mr. T——, and several other persons. No one was afterwards taken ill.

"I think I have shown by the above cases that, to say the least, the danger of contagion of plague, even during the raging of the epidemic, is greatly exaggerated, and I have now only to detail a few cases which have occurred sporadically as it at present exists in Alexandria; and I have no hesitation whatever in expressing my decided conviction that, unless the state of the atmosphere is favourable to the spread of the disorder, as is undoubtedly the case during the epidemic, there is no danger whatever from these sporadic cases, that they are purely accidental, and that it is impossible to produce by them the spread of the disorder. I have never seen a case of plague occurring sporadically where any person about the patient or in contact with him was attacked; and I cannot find any one that has seen one, although it is talked of among the Levantines as a common occurrence. I shall, therefore, relate only two or three striking cases, as any detail of a greater number would be mere useless repetition, the results (as to contagion) being in every case the same.

"*Sept.* 23, 1835.—Dominico Malich and Giovanni Sepich were brought to the hospital with plague, having been ill several days. Of these patients the latter died a few hours after his admission, and the former a few days afterwards. They were looked after by three Arab servants, who paid them every attention, and who were completely in contact with them, frequently lifting them in their arms when they rolled off their beds in their delirium. These servants were afterwards subjected to a Quarantine of 40 days, and they all remained in perfect health.

"*April* 18, 1837.—Thomas Griffith, a seaman of the ship 'Bristol,' in the harbour of Alexandria, was brought to the hospital with plague.

This patient was in free communication with all the ship's company, and was not sent on shore until he was very ill. The vessel was put in Quarantine for 40 days, but no sickness of any kind occurred.

June 5, 1838.—Nicola Azzopardi, a waiter in a European coffee-house, was brought to the hospital ill with the plague by a companion, who assisted in carrying him into his apartment. The patient had been in communication with a great number of people at the coffee-house; and, after his admission at the hospital, he was bled by a barber, and his head was shaved by another person. He was removed from the hospital by orders from the Board of Health, and died a few days afterwards. The coffee-house and everybody in it was shut up, and the poor barber and all his effects carried away to the Lazaretto. Of all the individuals thus exposed, no one has since been attacked with the disease.

" *May* 6, 1838.—The female servant of M. Cerrutti, the Sardinian Consul-General at Alexandria, was taken ill, and the disease was soon discovered to be the plague. The family of M. Cerrutti consisted of nine persons, including the domestics, and all of them were in constant personal communication with the patient, and every care and attention was afforded her. The patient died, and no other member of the family has been attacked since.

" The above cases will serve to illustrate the nature of the disease, regarded as a contagious malady, when it occurs sporadically."

The evil moral consequences of the exaggerated view of the contagiousness of plague so commonly entertained by the Christian portion of the Levant population, for the Mahometans almost universally disbelieved in its contagious nature, are thus depicted by eye-witnesses. " So great was the dread of the Christians," says Colonel Rose, " of cholera, that they forgot all the rights of humanity, even towards their nearest relations, not so the non-Christian sects.

" The Europeans felt indignant at such conduct, but I thought that example would be better than reproaches. I therefore visited a quarter near Beyrout, Ras Beyrout, where the cholera was violent. I have seldom seen such filth and misery, and never such selfish heartlessness. Little children abandoned in collapse and lying almost naked in the dirt or across thresholds of doorways, &c. I gave such assistance as I could; and at my next visit I was happy to find that my simple remedy of hot sand in bags on the body and warm clothing had saved several.

" In one house we found a young woman in the collapse; she was speechless and dying of thirst. Her husband had fled on the first sign of her illness; her grandmother crouched at a little distance, and her father, a respectable Christian, afraid to enter the house, refused to give her a drink of water. We gave water and assistance to her; ' See,' I said, ' what I do who am bound by no tie of affection, whilst you will not even give a cup of water to your dying child.' But he was deaf to every appeal, and

I was obliged to hire a Mussulman to attend the poor woman, who died in the night.

"My example, however, produced a general good effect, and at my last cholera visit the priest came, and all the relations did their duty by the patient."

"'No dread of contagion," says Dr. Bowring, "enters into the minds of the Moslems. Sixty thousand families were visited by plague in Egypt in 1835; there was scarcely an instance of a patient being neglected or abandoned by his friends and relatives. No dread of infection interfered between the kindness and charities, the attentions and hospitalities of neighbour to neighbour, of wife to husband, of mother to child, of sister to brother, of sons to parents, of priests to worshippers, of man to man. But among Christian Levantines, instances of inhuman desertion frequently occur; among them the alarm for their own safety often leads to a coward cruelty, which stands out in sad contrast to Mahomedan devotion.'"

Consul Sandison, Breessa:—"It is computed that one-third of the inhabitants in this city were attacked in the course of six weeks. But those who with most assiduity and resolution attended to the sick were not affected to indicate that their health had been in the least more endangered in consequence. And there were some deplorable examples of the isolation or abandonment of the sick, owing to the dread of contagion."

II. QUARANTINE.

The preponderance of evidence is in favour of the opinion that Quarantine is useless and even pernicious, whether enforced with reference to cholera or plague, though some consuls attribute the immunity of certain families and districts from those diseases to the strictness with which Quarantine was observed.

Colonel Rose says:—"Quarantines on the whole appear to do more harm than good. They prejudice affairs and trade, besides checking the aid which humanity ought always to give to sickness; however here they were useless. A rich Christian kept such strict Quarantine outside Beyrout that he excluded even the birds from his court, notwithstanding his wife, mother-in-law, and servants all died of cholera."

Mr. John Barker, through Sir Stratford Canning:—"A native Christian named *Jusuf,* son of Michael Kalpackgee, inhabiting a suburb of Aleppo, called '*El Salubeh,*' who was shut up in his house performing a voluntary Quarantine with a grown up son and two marriageable daughters, on the evening of the 1st August last were all four attacked by the cholera, and at sunrise, or very soon after, were all stiffened corpses."

Her Majesty's Consul Stevens, Tabreez;—"During the cholera which prevailed in and about Tabreez in the autumn of 1847, had several opportunities of ascertaining the uselessness on such an occasion of Quarantine regulations.

" On the appearance of the malady, Bahman Meerza removed with his family to Herbi, a village in a valley, twenty miles from the town, and kept a very strict Quarantine in his camp. I encamped with the English residents at Beera, two miles higher up in the same valley, and kept no Quarantine at all, being in daily communication with the town, and visiting it myself once a week ; several cases of cholera occurred in the Prince's camp, but not one in ours. All communication between the Prince's camp and Herbi was prevented ; still there were some cases in that village, while none appeared at Beera, although it was in constant communication with Herbi.

" The advantage of removal from a place visited by cholera cannot, however, be doubted, not for the sake of avoiding contagion, but to be away from scenes which keep the mind constantly occupied with the dreadful scourge, the fear of which does more towards propagating it, than contact with persons labouring under the malady."

Dr. Gregson :—" I consider Quarantines inefficient as safeguards against disease ; from their oppressive and partial operation, instead of diminishing they propagate disease, and hundreds have been sacrificed by being torn from their homes and thrust into crowded, overcharged, and tainted lazzarettos."

Mr. Abbott is asked :—" When the plague is at Alexandria is it usual for the Europeans to keep Quarantine ?—Yes ; but the male portions of the family go out, and they profess to keep Quarantine when out, by keeping every body at a certain distance with a stick.

" Have you known any instances of Europeans, who, keeping Quarantine and observing the precautions you have just mentioned, have been attacked with plague ?—Yes, many.

" Then you do not consider these precautions a sufficient safeguard against the disease ?—No, because I consider the disease infectious and not contagious.

" Were there cordons sanitaries around Alexandria during the continuance of the plague ?—Yes.

" Did they have the effect of checking the disease ?—No. I have never known any benefit accrue from the numerous cordons that have been at different times established in this country. The disease has universally spread in spite of them. The supposed benefit accrues not from the cordon, but from the soldiers being employed to remove the patients from their mud huts into more healthy and better ventilated dwellings, and in the cleaning or destruction of infected habitations."

Several other medical officers give similar evidence, but the most decisive is that given by Dr. Laidlaw, with reference to the result of the largest and most stringent Quarantine experiment ever performed.

" As soon as the disease was ascertained to exist in the town," (Alexandria) he says, " all the European inhabitants put themselves in Quarantine, and nothing was received into their houses without being previously smoked or passed through vinegar and water. The most abominable system of annoyance to the inhabitants was adopted by the sanitary police, in the hope of stopping the propagation of the malady. Every house in which the disease was discovered was instantly closed, and guards placed around it, the miserable inhabitants being removed to the lazaretto. One of the first cases of plague occurred in the European hotel, and which was frequented by great numbers of Europeans. The sanitary police with a large body of soldiers blockaded the house at the usual hour for dining and actually seized, in defiance of all law and justice, upwards of forty persons, the great majority of whom had only entered a few minutes previously for the purpose of dining, and carried them off to a miserable lazaretto, where no sort of comfort and scarcely the necessaries of life were afforded them, to perform an expurgation of forty days. The surgeon, also, who had attended the patient, was put in Quarantine for the same period.

" Notwithstanding, however, the severity with which the police regulations were enforced under the despotic and irresponsible direction of a Board of Health, notwithstanding that every vessel coming from a suspected port was subjected to a strict Quarantine, in order to prevent any new importation of the suspected virus, still the epidemic steadily pursued its course, just as it had always done before, when none of these precautions were adopted, daily increasing the number of its victims as the season favourable for its propagation advanced, until it was found that the shutting up of infected houses was worse than useless, and the Pacha, more humane than the infatuated Europeans who advised him, ordered that all further attempts to stop the progress of the disease by sanitary regulations should be abandoned. It is not unreasonably conjectured that during the above-mentioned period, great numbers of persons died of plague, and who were buried in their dwellings by their relatives, in order to avoid the nuisance of Quarantine, and from the decomposition of their bodies, a new contamination was constantly added to the vitiated atmosphere. Thus ended a most decided attempt, backed by all the authority of despotic power, and exercised with the most merciless severity, to arrest by Quarantine the progress of the disease. If these measures had been put in force when the disease was on the decline, and the altered condition of the atmosphere was no longer genial to its propagation, as was the case at Malta, in 1813, they would have appeared to have succeeded, because whether they were adopted or not, it would have ceased as it did here, after all measures had been abandoned; but in this case, having commenced the shutting up at the very first breaking out of the epidemic, a fairer trial of the efficacy of this much extolled means of safety was afforded, and the result has shown that its boasted efficacy was futile, and that the disease was not to be confined within bounds by any guards or sanitary cordons."

Still there are statements that the observance of Quarantine appeared in some instances to prevent the visitation of cholera.

Her Majesty's Consul, *Mr. Richard Wood,* writing from Damascus, says:—" Whether the cholera be contagious or not is a question which yet remains undecided: still it may be remarked that almost all the families that put themselves in strict Quarantine have escaped its influence, notwithstanding that the disease raged in their immediate neighbourhood. As intense fear brings on the disorder, it may be that they owe their escape to the feeling of security which they derived from this precaution. With very few exceptions, all the villages which established sanitary cordons did not suffer from it, and this, perhaps, will account for the comparatively larger amount of mortality among the peasantry in the north, who omitted to adopt the same system."

Mr. Gordon, Her Majesty's Consul, Stockholm, writes:—" Two or three cases of cholera have lately occurred on board vessels lying in Quarantine at one of the stations at the entrance of Stockholm. This is the second occasion since the establishment of the Quarantine on the Swedish coasts that the cholera appears in all human probability to have been prevented by such agency from gaining a footing, if not from spreading in the capital and this part of Sweden; and I take the liberty of calling your Lordship's attention to the above facts, as they would seem to justify the conclusion that under certain circumstances it may be possible by strict Quarantine regulations to arrest the progress of the disorder."

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